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ORIGINAL ARTICLES

Diathermy in Ophthalmology ..... A. D. Ruedemann, M.D., and W. J. Zeiter, M.D. 451
Discussed by Drs. Ramon Castroviejo, Joseph I. Pascal, Walter R. Loewe and Luther C. Peter.

Orthopedic Gymnastic Treatment of Spinal Abnormalities ..... Henry G. Hadley, M.D. 455

Electrosurgery of the Brain and Spinal Cord ..... J. G. Lyerly, M.D. 459

Colonic Irrigation: Indications and Technic ..... Wade Cline, M.D. 465
Discussed by Drs. Kenneth Phillips and W. E. Bippus.

A Simple Device for Forced Flexion of the Knee ..... Earl C. Elkins, M.D. 468

Esophageal Dysfunction Treated With Sinusoidal Current ..... M. J. Mandelbaum, M.D. 470

Roentgen Therapy in Otorhinology ..... Matthew S. Ersner, M.D. 477
Discussed by Drs. Raphael Schillinger, G. Allen Robinson, Maurice Lenz, and Matthew S. Ersner.

Therapeutic Advances in Vasomotor Rhinitis and Bronchial Asthma ..... J. A. Haiman, M.D. 486
Discussed by Drs. A. R. Hollender, George Major, Lewis J. Silvers, and J. A. Haiman.

Detachment of the Retina — End Results of Electrosurgical Treatment ..... Hugh S. McKeown, M.D. 489
Discussed by Drs. Luther C. Peter, Greenfield, Harvey E. Thorpe and Hugh S. McKeown.

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EDITORIALS

Our Tribute to Schereschewsky 495

Status of Electrosurgery 496

•

SPECIAL SECTIONS

In Memoriam 498

Science, News, Comments 499

Book Reviews 503

•

INTERNATIONAL ABSTRACTS

Abstracts from Physical Therapy, X-Ray, Radium, Biophysics 505

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of the new
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DIATHERMY IN OPHTHALMOLOGY *

A. D. RUEDEMANN, M.D.
and
W. J. ZEITER, M.D.

CLEVELAND, OHIO

The chief problem in all acute diseases of the eye is to administer immediate treatment to the affected part. It is generally appreciated that the eye does not well tolerate infection or inflammation, so that recovery is usually very poor and visual loss may be great. On the assumption that diathermy offers a medium for immediate treatment, we have used deep heat in sixty patients for ninteeen different ocular conditions, which series, although too small for final deduction, offers certain interesting observations.

It is not amiss to state at the outset that we do not use diathermy exclusively in these cases, although in central venous thrombosis and other thrombotic lesions, we believe it is equal to and probably better than most accepted treatments. Five patients with central venous thrombosis have been treated, two of whom were seen early and treatment instituted twice daily. These patients obtained an excellent result, in one the result was only fair, and in two were poor. In two other patients with late venous branch thrombosis absorption appears to have been hastened and the eye was spared a long period of hampered blood supply. One case of orbital thrombosis was materially benefited by making the patient more comfortable. Superficial heat is of little value in deep orbital inflammation, while diathermy was found to be fairly comforting and beneficial. Deep heat was tried in only one patient with arterial closure and it was apparently of little or no value, although if seen early, this form of treatment might prove beneficial.

Some benefit is derived from diathermy in corneal lesions because in five of the six patients treated a good recovery was made, the healing time was lessened, and the patients were much more comfortable.

This treatment has been tried in tarsitis and episcleritis. Two patients with tarsitis were made more comfortable and apparently in one there was some effect in halting the progress of the infection. One patient with herpes zoster and a considerable amount of post-herpetic pain, was considerably relieved during the period she was receiving diathermy.

There were nine patients with the uveal tract involved — either choroiditis, traumatic uveitis, or iridocyclitis. In acute choroiditis, the association with typhoid vaccine therapy may have had some bearing on the end result in that the patient made an excellent recovery, while in those having chronic uveitis, of which there were four, the process was stopped, but deep heat had little or no effect on visual recovery, which was poor.

Two acute cases of infectious iridiocyclitis, and two of traumatic uveitis were benefited by deep diathermy.

Patients with lesions of the cornea and acutely inflamed conjunctiva apparently are made more comfortable with deep diathermy although it cannot be used as an isolated form of treatment. The former treatment was also used in one patient with chronic edema of the orbit which could not be diagnosed, and out of two patients having malignant exophthalmos, one was benefited by deep heat to the orbit. In one patient with

* Read at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 6, 1939.

pulsating exophthalmos, apparently no benefit was derived from this or any other form of treatment.

For one patient who had severe vitreous degeneration, treatment was prescribed and apparently there was no effect on the absorption or prevention of further vitreous opacities. (This apparently was a chronic degenerative process and deep heat has no effect on chronic degenerative processes involving the vitreous.)

In post-operative inflammation or infection deep orbital heat is not only comforting to the patient but has a beneficial effect on arresting the progress of the inflammatory process. Diathermy was tried in four patients having retinal detachment in whom we felt no benefit could be obtained by surgery. These either had an exudate in the vitreous or the retina was so severely detached that operative measures could not be attempted. As was to be expected, the results obtained in this group were poor.

There was one individual with optic atrophy due to tertiary syphilis who was also receiving artificial fever therapy. There was probably no lasting benefit although visual improvement was noted.

In acute inflammatory glaucoma, there was some actual beneficial effect. There is more comfort and heat apparently has some tendency to reduce the intraocular tension. In one instance of bilateral acute inflammatory glaucoma subsequent to the use of scopolomine, the vitreous in both eyes was filled with an exudative material, probably blood, and deep heat was used to both eyes with beneficial effect, so that tension was reduced in a short time with restoration of vision in both eyes. One patient with acute inflammatory glaucoma refused an operation. Deep heat was used in conjunction with eserine and vision returned to normal without loss of field.

Heat is of some benefit in acute inflammatory glaucoma and probably of little or no benefit in chronic non-inflammatory glaucoma, although this will have to be tried out in a larger series. Using it on alternate days with typhoid therapy, we have tried it in five cases of retrobulbar neuritis with apparently good results. However, typhoid vaccine has always been of benefit to these patients so we do not know whether the results were secondary to the use of deep heat. Diathermy should be given some credit for the results obtained in this group. We intend to employ this treatment in more ocular conditions both alone and in conjunction with other forms of therapy.

In summing up our study we are led to believe that it would be of benefit in patients having acute inflammatory glaucoma, to lessen the intensity of deep orbital pain. It is of value in cases of orbital and ocular inflammation, especially in the acute stage. It has also proved effective for deep corneal ulcers and in the early cases of central venous thrombosis. Apparently no benefit is obtained in retinal detachment. We have had only four cases of ocular tuberculosis, and they were not benefited by this treatment.

Deep diathermy undoubtedly has a place in ophthalmology. It is an excellent adjunct to conventional treatment, and should be tried in many more cases until the proper field for this form of therapy is established. It surpasses superficial heat in all lesions of the orbit. Very few patients complain of any discomfort and the vast majority are improved. The average number of treatments given were seven, while as many as 62 have been given to one individual.

Technic

All short wave diathermy treatments were given in the form of electromagnetic induction. The wavelength of the apparatus was 24 meters. Ap-

plication of the cable is simple and convenient. The usual spacing of ½ to ¾ inches was obtained by the use of four bath towels' thicknesses. This is obtained by folding two towels once. If one eye is treated the patient lies on his side with the affected eye uppermost. The towels then cover this eye and the side of the face. When both eyes are treated the patient lies on his back and the toweling or padding covers both eyes and extends up over the forehead. The cable is coiled into one loop and is then applied so that it is placed over the eye or eyes to be treated.

It is well known that the eye is a sensitive organ and therefore some judgment must be exercised as to the amount or intensity of heat used. In an inflammatory process congestion is present and adding excessive heat will produce greater congestion and intensify the process and pain. The amount of heat is more or less determined, as in other parts of the body, by the patient's tolerance and reaction. We deem it better to be conservative when these treatments are given and not to attempt to give the patient a dosage to cause discomfort. When one is familiar with the output of his apparatus and the reactions of the patients, the intensity of heat can be easily determined.

When possible, two treatments are given daily, the first early in the forenoon, and the second during the late afternoon. The initial treatment is employed to determine the patient's tolerance and his reaction. The duration of the session is arbitrarily set at 15 minutes and if this is well tolerated the time of the succeeding applications is increased to 20 minutes.

Discussion

Dr. Ramon Castroviejo (New York): For the past five years I have used diathermy extensively in many ocular conditions. My experience is similar to that of Drs. Ruedemann and Zeiter. Like them, I found diathermy of benefit in corneal conditions, conditions of the uveal tract and vitreous opacities. In several cases of retinitis pigmentosa, the patients felt improved, although I was unable to detect any change either in vision or visual fields. In episcleritis and scleritis, grenz ray proved to be more helpful than diathermy. Since it has been claimed by experienced physiotherapists that diathermy has a tendency to increase intraocular tension, I did not dare use it in any type of glaucoma. However, no tendency was found to increase tension in any of the eye conditions that I treated by diathermy. Diathermy was found to be particularly useful for alleviating pain, specially in severe iritis. Of all the electrodes used for ocular diathermy, those of Cepero and Comas have in my experience proved the most effective.

Dr. Joseph I. Pascal (New York): The presentation of Drs. Ruedemann and Zeiter outlining the use of diathermy in nineteen different ocular conditions is certainly replete with interesting and instructive facts. What struck me most is the reported success in the two cases of acute glaucoma. This condition, when for one reason or another, operative procedure is not feasible, is a heartache to the ophthalmologist. Drug therapy, both in scope and efficiency is very limited, and if diathermy offers an effective aid to the few drugs available for this condition it will be a god-send. The report is rather cautious, naturally. I do hope we shall get more positive information on this phase of physical therapy based on more experimental and clinical findings, at an early date.

Dr. Brown's paper covers the subject of physical therapy in ophthalmology in a delightfully concise and complete manner. There is little I can add to it. His statement that physical therapy is a "neglected . . . mode of treatment," a statement I fully agree with, calls for some comment. I have often wondered why this is so, since physical therapy, aside from its direct beneficial effects, is so much more impressive to the patient than drug therapy. I mean impressive in an ethical sense. In physical therapy the physician actually does something for the patient, that is there is a visible and tangible treatment, not merely writing a prescription or placing a drop of medicine on the eye. This feeling of being actively treated has a wholesome, psychologic effect. It fits in well with the modern conception of treating every organ or part of the body as an integral part of a human personality, embracing both soma and psyche, body and soul.

One phase which has not been mentioned is physical therapy in amblyopia and strabismus, latent and manifest. In orthoptic training, after a period of exercise the use of mild massage and some diathermy is generally soothing to the patient. This phase of eye work may be considered a part of physical therapy, involving as it does the use of various physical agencies and devices, such as lights of different colors, intermittent flashers, revolving discs, and many other physical appliances to stimulate and develop an

amblyopic eye, and to establish binocular fixation and binocular vision. There is no drug therapy for amblyopia associated with strabismus nor for the strabismus of the non-paralytic type. Surgery in the latter condition, is the only means available. But along with it the judicious use of physical therapy and physical devices is very valuable.

Dr. Walter R. Loewe (New York): After carefully analyzing the reports of Drs. Ruedemann and Zeiter on the use of diathermy in ophthalmology, I am further convinced that we are but on the threshold of greater achievement in the field of this physical therapeutic agent, which is more and more proving its value in ocular infections. Of prime importance in the treatment of infections in and about the orbit is that it is necessary to have an exact knowledge of the output of the individual apparatus and the reaction of each individual patient after an initial treatment well below what is considered a unit of treatment, which I place at 15 minutes and at comfortable heat sensation. In view of the fact, that there is no standardized technic, and that individuals and machines vary as to output and reaction, extreme caution should be taken to stay within the point of tolerance, and emphasis should be laid on the word "comfortable." In other words, it is definitely hazardous to proceed beyond the point of comfort. If heat beyond this point is obtained, tissues which are already weakened by infection may be damaged. Such damage, as we already know, can be permanent. The output of each instrument being different and the toleration of heat varying, renders standardization almost impossible at this time. In order that the patient be induced to continue the necessary series of diathermy treatments, first and foremost he should be made comfortable, by not having excessively long or intense treatments. This too, is a factor in safety. Obviously the earlier in the course of infection the treatment is instituted (within the range above mentioned) the better the results will be. I noted with keen interest that in this series of cases all other approved methods in ophthalmology were used in addition to diathermy. Diathermy has proved the best method to date in the management of deep vascular disturbances of the eye, but too much is not to be expected or hoped for in these conditions. Of course, in inflammatory processes a greater measure of vision can be retained because deep heat, if applied sufficiently early, has an inhibiting effect on the destructive processes which affect these delicate tissues.

In the treatment of conditions involving the anterior segment of the eye, such as episcleritis, iritis, and painful corneal conditions of the herpetic group, we are early rewarded with a definite diminution of pain, and by increasing the circulation the processes of repair are soon instituted. Too much has been looked for in diathermy as a cure for many ocular conditions. As one of the best examples of this is in the fact that many individuals have been using diathermy over a long period to improve the vision in detachment of the retina. I have not seen or ever heard of a case of detachment that was benefited with diathermy, and it is quite obvious that the only way this condition can be improved, is by other methods, such as electrosurgical intervention.

Reports in the use of diathermy in glaucoma merit further study, but the usually effective ophthalmologic treatments should not be disregarded in any case while physical therapy is applied. To do so in my opinion would be dangerous and criminal.

Dr. Luther C. Peter (Philadelphia): I want to add one word to the papers that have been so well presented, namely, in reference to the use of heat and cold. Heat and cold are used so universally, not only by the ophthalmologist but by all practitioners, that I believe we should have some concrete indications when heat and when cold should be used and the limitations of each. I have always felt that cold should be restricted to traumatic cases and even then for the first twenty-four hours. As pointed out by the essayist, cold, when applied too long, may do damage to the cornea. I also am a believer in the use of cold compresses and not contact with ice. One will never have any serious damage done to the eye tissues if cold compresses are used instead of ice applied directly to the eye. Furthermore, I cannot exactly agree with the essayist on the duration of the effect of heat and cold. Cold should be applied continuously if one expects to get any results, and not intermittently, because the moment the cold, iced compacts are removed, there is a terrific rebound of the vessels and their capillaries.

I would also like to compliment Dr. Ruedemann and his associate in the presentation they made, in their urging of the use of diathermy in our practice. I am afraid we get into ruts and we fail to accept newer thoughts and newer ideas, and surely there are so many cases in which diathermy may be of great value to us. If we are going to use this agent, it is important, of course, that we learn its limitations, dangers, and advantages. As pointed out, too much diathermy may cause damage to the tissues. Therefore, if we use it, and we should use it much more in the future than we have in the past, we must thoroughly master the technic.

ORTHOPEDIC GYMNASTIC TREATMENT OF SPINAL ABNORMALITIES

HENRY G. HADLEY, M.D.

WASHINGTON, D.C.

In all conditions prevention is easier and more successful than cure. Especially is this true of spinal deformities. Whereas it is quite easy to apply surgical and mechanical measures to the joints of the extremities, the complexity and the relatively inaccessible location of the spinal joints made the treatment of them much more difficult. A thorough understanding of anatomy is necessary to direct intelligent treatment.*

The word "orthopedics," combining the roots *orthos* — straight and *pais* — child, was defined by Nicholas Andry[1] as the art of preventing deformities in children. Though St. Germain[2] urged a change of "pais" to "paidias" — education — the usage of the word continues, but the ideal is not yet attained. We prevent infants from crying, which would develop the respiratory organs and muscles; we prevent them from crawling freely which develops the skeletal muscles; then we seat them on soft cushions, which encourages kyphosis by the consequent tipping backward.

While early civilizations, such as that of the Egyptians, made use of physical exercise, the Greeks, during the classic period, cultivated the ideal of an harmonious development of all the individual faculties. This ideal was set aside or forgotten during the Middle Ages, but is now coming to the front again.

Greek children of that classic period were brought before a council of old men whose decision was final as to whether they should be reared or not. The decision was based on the physical condition. The first six years were passed in the home. The school of the body was the palaestra, a name derived from the Greek word for wrestling. It was similar to the private school of today. All forms of exercise and games were practiced without the wearing of clothing of any sort. Later the children joined the grown men in the gymnasium which was a state institution and maintained at public expense.

The practice of exercising naked must have stimulated each participant to make himself an object worth beholding, and the sculptor thereby received great opportunities for study of the human body in repose and action, as attested by the excellence of Greek statues.

Effect of Voluntary Exercise

Voluntary exercise has great value because of the resulting increased blood supply and circulation rate which may be ten times that during rest. The output of the heart during rest is three to five liters per minute, and during severe exercise this amount may be increased to thirty-four liters per minute. To accomplish this the total blood must circulate seven times through both heart chambers. While doing this volume of work the heart requires as much oxygen as the whole body does at rest.[3] The blood supply of the muscles and vital organs may be increased twenty times during exercise due to the opening up of resting capillaries. This added blood supply eliminates accumulated toxic material and cannot fail to have a bene-

* The reader is especially referred to the work of Spalteholz's "Handatlas der Anatomie des Menschen." Verlag von S. Hirzel in Leipzig, 1932, pp. 302-314.

ficial effect upon the physical and mental attitude. The metabolism increases from one calorie per minute during rest to ten to fourteen with moderate exercise, while with severe exercise sixty calories per minute may be required.

Exercise increases respiration, for while the average normal inspiration and expiration uses only 500 cc., the deep inspiration and expiration necessitated by strenuous exercise may require five to eight times as much.[4] The pulmonary ventilation may increase from the six liters per minute used at rest to one hundred liters per minute during vigorous exercise.

The blood takes up sixty times as much oxygen from the alveolar air as the same amount of plasma or twenty cc. per one hundred cc.; the difference being due to the combination with hemoglobin. The saturation with oxygen is ninety-five per cent, this being the usual maximum as the oxygen tension in the alveoli is not equal throughout. The total amount held by the blood is 1200 cc. (200 cc. per liter), which is sufficient for the requirements of the tissues for five minutes during rest and for a fraction of a minute during muscular exertion.[5] The oxygen consumed during rest is 250 cc. per minute and during violent exercise it may be increased to 3,500-4,000 cc. per minute.[6]

Deep breathing affects the great abdominal and thoracic veins, which pass through the diaphragm, and are attached to it. This suction and force pump action is an important aid to the venous circulation. It decreases the liability to congestion of the abdominal organs and may relieve certain tendencies to orthostatic albuminuria and to pelvic disorders of women.[7]

There are permanent effects of continued exercises such as the slow pulse characteristic of athletes due to the larger stroke volume of the heart.[8] The increased efficiency is shown by the lessening of the rise of the pulse and blood pressure following exertion. Many forms of exercises are valuable to establish the general muscular balance such as walking, deep breathing and setting up exercises with forward and lateral bending. Additional exercises, such to completely crush a double sheet of newspaper until it is a ball in the palm of one hand without the aid of the other are helpful for the upper extremities, and unilateral or bilateral knee bending with the hands back of the head for the lower extremities.

Selective Exercises

In scoliosis, Klapp's[9] methods of crawling in various ways are valuable such as crawling in a circle or in a bent position to compensate for the deformity by keeping the arm on the concave side continuously advanced forward. Patients with scoliosis should rest and sleep in a position to counteract the deformity, the arm extended upward and outward on the concave side, with the shoulder extended and the arm on the convex side lowered against the side. Exercises may be carried out in the same manner by bending with the same arm extended and the other hand pressed against the hip or the gibbosity. Bending against a strap resistance adjusted according to the curvature may be quite effective.

In lordosis the following may be used: Elevation of the head and thorax on a table with the feet strapped and also elevating the legs in an upright position, side-bending to develop the lateral muscles of the abdominal wall, the Mohammedan prayer (knee chest) attitude, and exercises standing on the seat of a chair with the hands on the back and alternately bending the arms, legs, and trunk.

In kyphosis, exercises in addition to general gymnastics, may be used. For example: Lying face downward on a table, raise the legs in extension,

or the head and shoulders, depending on the location of the deformity. The two parts of the exercise may be combined, the patient grasping the ankles with the arms backward. For the "round-back" individual, the following exercise is indicated: Vertical traction or swinging forward on rings and backward shoulder stretching with the hands placed on two chairs, leaving room for the body between, then leaning forward with alternate flexion and extension of the arms. Both methods push the shoulders backward upon the thorax and expand the chest anteriorly. The patient may, by grasping a staff in both hands, extending the arms over the head and bringing the staff backward against the rounded portion of the spine, use backward leverage to extend it.[10]

Among those having spinal deformities are individuals having cardiovascular disease or obesity. These conditions had, therefore, to be considered in outlining a course of treatment. Physical exercise is contraindicated in a few conditions such as acute cardiac diseases, active pulmonary tuberculosis, aneurysms, and advanced arteriosclerosis where there is immediate danger of cerebral accident. But the great majority of chronic diseases including cardiac affections are benefited.

Stokes[11] had found before 1857, that exercises are especially beneficial in cardiac diseases. He favored mountain climbing and exercise rather than quietness and rest. The active exercise increased the utilization of oxygen and results were secured where digitalis did not benefit. Very little attention was given to this, however, until Oertel[12] instituted a system of graduated exercises consisting of twenty-two walks, beginning with one-twelfth of a mile at a three per cent grade and gradually progressing to two miles at a fifteen per cent grade. Mackenzie warned that these should not be too arbitrarily prescribed, but always adapted to the individual patient.[6]

Schott,[13] finding that movements with a purpose were much more beneficial than movements without design, used resistance movements. In more advanced cases where very active exercises could not be used, he did not occupy all the time with diagnosis and pathological anatomy to the neglect of therapy. Instead, he made use of exercises with resistance. The Schott movements are performed by the patient while an assistant resists in the opposite direction the muscular action of the patient.

The operator must not grasp or constrict in any way a portion of the patient's body. Every exercise is performed so slowly and the resistance regulated in such a way that the patient is always in condition to breathe freely. The fatigue of single muscles is avoided by bringing alternately new groups of muscles into action and making a pause after each movement. Schott used some nineteen different movements. When all the muscles of the trunk, arms, and lower extremities have been exercised in this manner, and the patient's condition admits of it, the exercises may be repeated in several series. The different kinds of motion — flexion, extension, abduction, adduction, and rotation — are performed according to the nature of the articulations. After these are learned by the patient, he may use the same exercises with self-resistance.

Calver[14] recently has had considerable success with exercises at the United States Capitol in the prevention and treatment of coronary vascular disease. He feels that the metabolic rate in hypertension must be higher than in those without hypertension, for the heart expends more energy in pumping against the increased peripheral resistance.

To secure the greatest benefit, exercises should be directed by the physician himself, or by someone capable of exactly carrying out his orders, as the patient himself or the family is often too careless to secure satisfactory

results. These exercises must be definitely outlined and must have a purpose, which should be clearly explained to the patient to secure his full cooperation. The physician must take into consideration the patient's usual mode of life, as it is pointless to tell the milkman to take early morning walks or the bricklayer to take bending exercises.

There is a great deal of truth in the belief that certain diseases are caused by disturbances of the spine and neighboring structures. The physician who uses gymnastic and physical exercises in the prevention and treatment of disease will have far greater success in both and will maintain the confidence of his patients by demonstrating a knowledge of anatomy and physiology. The patients will not feel the need of seeking the services of irregular practitioners who profess to treat all manner of diseases by manipulations of the spine. Systematic training in the World War did wonders for many a soldier's physical condition, and the intelligent physician can accomplish the same results through similar agencies.

1252 Sixth Street, S. W.

References

1. Andry, Nicholas: "L'orthopédie ou l'art de prevenir et de corriger dans les enfants, les difformitiés du corps, 2v.47, CXVIII, 345 pp., 11, 15 pl., 365 pp., Paris. La Veuve Alix, 1741.

2. St. Germain, Louis: Deviations laterales du roches. Traitment de la scoliose, extrait des leçons cliques d'orthopédie, Recueilles et publiées par le Dr. Pierre J. Mercer; Paris, Maltests and Cie, 1882, p. 16.

3. Hill, A. V.: Muscular Movement in Man. The Facts Governing Speed and Recovery from Fatigue, New York, McGraw and Hill Book Co., 1927.

4. Meakins, J. C., and Christie, R. V.: Lung Volume and Its Variation, Ann. Int. Med. **3**:423 (Nov.) 1929.

5. Christie, R. V.: The Lung Volumes and Its Subdivisions, J. Clin. Investigation **11**:1099 (Nov.) 1932.

6. MacKenzie, M., and Orr, J.: Principles of Diagnosis and Treatment in Heart Affections, ed. 2, London, Frowde, Hodder and Stoughton, 1923, p. 186.

7. Miller, N. F.: Additional Light on the Dysmenorrhea Problem, J. A. M. A. **95**:1796 (Dec. 13) 1930.

8. Bock, A. F.: On Some Aspects of Physiology of Muscular Exercise, New England J. Med. **300**:638 (March 29) 1929.

9. Klapp, F.: Funktionelle Behandlung der Skoliose, Jena, Fischer, 1907.

10. Mikulicz, J. von, and Tomasczewski, Valeska: Orthopädische Gymnastik, Jena, Fischer, 1908, p. 19-105.

11. Stokes, Wm.: Disease of the Heart and Aorta, Dublin, Hodge-smith, 1854.

12. Oertel, Max Joseph: Therapie der Kreislaufs-Störungen, Kraftabnahme des Herzmuskels, ungenügender Compensationen bei Herzfehlern, Fettherz and Fettsucht Veränderungen, im Lungenkreislauf, etc., ed. 2, Leipzig, Vogel, 1885.

13. Schott, Theodore: Chronic Muscular Diseases of the Heart and Their Treatment. Reprinted from New York M. J. **85**:865, 1907.

14. Calver, G. W.: Coronary Accidents, Remarks on Anticipation and Prevention. Address delivered before the Maryland Academy of Medicine and Surgery, Baltimore, Md., December 20, 1938.

ELECTROSURGERY OF THE BRAIN AND SPINAL CORD *

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The application of electrosurgery covers a period of approximately the past fifteen years. It was chiefly Clark[1] and Ward[2] who called our attention to it and adapted it to modern needs. In 1928 Cushing[3] discovered its use in neurosurgery. He gave it such an enthusiastic introduction that it was soon followed by most of the other neurosurgeons. His article was followed by similar and additional applications of its use by Davis[4] and Sachs.[5]

We have medical diathermy in which the high frequency current passes through the body and increases the temperature without producing destruction of the body tissues. Surgical diathermy, which is electrosurgery as we know it, produces destruction of the tissues at the point of contact where the electrode is applied under control of the operator. The modern and successful electrosurgical instruments manufactured today have a frequency of one or more million oscillations of current per second and they are free from the side discharges which would make it objectionable and harmful in operations on delicate nerve tissue. I recall in 1926 when the instruments were not as perfect as they are today, while cutting through brain tissue in the dog in some experimental work frequently convulsive movements were observed. In a short time the instrument was perfected so as to eliminate these objectionable features and today we can either cut or coagulate brain tissue even in the most irritable zone without the slightest signs of twitching or convulsive movements.

We have one type of current used for cutting which is the undamped high frequency current. In this type the oscillations are of equal amplitude, and the waves are more or less even and smooth. This type of current cuts through the tissues with little or no coagulation. A slight modification in the height of these waves can be utilized so that some of the waves are longer than others in which case a certain amount of coagulation is obtained. A second type is the coagulating current in which the waves gradually diminish in amplitude followed by a pause and then recurrence. The effect of this current is to coagulate, cook or sear the tissue. The third is a dehydrating current which consists of a very high voltage and low amperage. It is used by holding the electrode close to the tissue so that the current jumps across the gap causing a superficial coagulation, dehydration and charring.

The coagulating current is the most useful and desirable in neurosurgery. It is seldom necessary that the electrode be placed directly in contact with the vessel to be coagulated. Nearly all the coagulating of vessels is done by touching the electrode to the handle of the tissue forceps or hemostat which is in contact with the vessel to be coagulated. In some cases the vessel is cut first and then the bleeding point is picked up with forceps and coagulated. If it is a large vessel it may be more safely controlled by coagulating several millimeters along its course from the cut end. This is especially true in controlling the cortical veins running from the brain to the longitudinal sinus. This insures against the danger of the vessel blowing out and bleeding at a later date.

* Read at the Southeastern Sectional Meeting of the American Congress of Physical Therapy, Jacksonville, Florida, July 10, 1939.

Before electrosurgery came into general use vessels in the brain and about a tumor had to be controlled by means of Cushing silver clips or silk ligatures which may be difficult to apply. It was not unusual to apply several dozen or more silver clips in the process of a brain tumor removal. Sometimes a free muscle graft was held over a bleeding point until it coagulated and controlled the bleeding point. Since the days of electrosurgery it is seldom that a silver clip or a muscle graft is used, except to control bleeding from an artery where the pressure may cause the end of the coagulated vessel to blow out.

One of the most important uses of electrosurgery is the control of the middle meningeal vessels in the dura after the bone flap is turned down. With the electrode against the handle of the forceps the tip may be passed along the meningeal vessels thereby coagulating them and insuring a dry field. In making incisions through the pia arachnoid into the brain substance it is not unusual to have trouble with bleeding of smaller vessels on the surface of the brain. With this same technic these vessels can be satisfactorily coagulated so that the incision may be made with absolutely no bleeding. In this way lobectomy can be done without a ligature or silver clip except on some good sized artery. In lobotomies, lobectomies, and block dissections for tumor it is preferable first to coagulate the vessel and cut with the scalpel rather than relying on the cutting current to control these vessels.

Indications

One of the most vascular tumors we have to deal with in brain surgery is meningioma. This is a rather slow-growing, benign tumor, and it has a large number of blood vessels surrounding it coming from the brain or dura. These vessels can be controlled most satisfactorily by electrocoagulation before they are cut. These tumors are sometimes relatively inaccessible, growing from the base of the skull in the region of the lesser or greater wing of the sphenoid or even in the region of the sella turcica. They occasionally occur in the lateral ventricles. A more favored location is on the surface of the brain in the region of the sagittal sinus. When they occur in awkward places it is preferable to remove them piecemeal. This can be done by cutting out sections of the tumor with the electric knife, or looping out bits of tissue with the wire loop, until the tumor is reduced in size, when the remaining portion is removed through a relatively small opening. After the tumor has been reduced in size the surrounding vessels can be more easily picked up and coagulated. In this way a large tumor may be removed completely in one stage, while before the advent of electrosurgery it was not unusual to do it in two or three stages.

In operations on tumors of the glioma group the procedure is made less difficult by electrosurgery, regardless of the degree of malignancy. In glioblastoma multiforme, one of the most malignant varieties of gliomas, considerable relief can be given to the patient by block resection of the tumor. The surrounding bleeding vessels can be picked up with a pair of forceps and controlled by electrocoagulation. Electrosurgery is especially useful in the astrocytomas where there is a nodule of solid tumor in the wall of a large cyst. The mural nodule may be removed in one large piece or in sections by means of the wire loop and the cutting current. These are relatively benign tumors and after thorough removal a long period of relief may be obtained. The same principles are used in dealing with the medulloblastomas, a type of tumor frequently seen in childhood. Since this tumor is very amenable to x-ray therapy it is not necessary to be so radical in the surgical

removal, but whatever operation is done, whether for biopsy or for resection of the tumor, it is made simpler by electrosurgery.

There are many other operations done on the brain in which electrosurgery is of definite value. In operations for cutting the posterior root of the fifth cranial nerve in tic douloureux by the temporal route, the middle meningeal vessels can be easily controlled by electrocoagulation. In operations on the cerebellopontine angle, for tumor in this region, for cutting the vestibular portion of the eighth nerve in Menière's disease, or for resection of the posterior root of the fifth nerve in tic douloureaux, a vessel running from the cerebellum to the dura in this region can be controlled by electrocoagulation before it is cut. In operations on brain abscess it is sometimes desirable, if the abscess is superficial, to make a small incision through the cortex, after first sealing off the meningeal spaces by electrocoagulation. In this way the abscess can be opened widely to inspect the cavity of the abscess throughout its entire extent without fear of spreading the infection on the surface of the brain.

In traumatic brain surgery where operation has to be done for compound or comminuted depressed fracture with laceration of the dura and the brain, there may be torn a considerable number of vessels. With the area exposed and the bleeding points seen, the vessels may be picked up and easily coagulated. In this way a better and more complete repair of the injured brain tissue and overlying dura can be accomplished in a dry field. There is also less danger of infection because one is less apt to leave material and blood clots which may predispose to infection in a contaminated wound. In extradural hemorrhage after the clot is removed the bleeding vessel may be controlled with greater ease by suction and electrosurgery.

There is scarcely an operation in brain surgery in which electrosurgery is not used. In all operations on the spinal cord, whether it be for spinal cord tumor, laminectomy in traumatic cases, or removal of dislocated intervertebral discs, one feels at a loss without electrosurgery. Any bleeding vessel in the process of the operation can be picked up with a pair of forceps and coagulated. In operations on the extremities for peripheral nerve lesions, electrosurgery is useful and it saves time to control the bleeding vessels in this way. I find it does not in the slightest degree interfere with healing.

Anesthesia. — The choice of the anesthetic is important in electrosurgery. Since there may be sparks from the electrode the highly inflammable anesthetics as ethylene and cyclo propane should not be used. With ether anesthesia electrosurgery has been used under certain precautions by shielding the anesthetic field with a wet towel. With this precaution no explosion or harm has been seen in a single case. The anesthetic of choice in brain operations, whether electrosurgery is used or not, is local anesthesia alone or in combination with avertin. With this type of anesthesia the patient tolerates a long operative procedure better without shock and it has the added advantage of not complicating nor raising intracranial pressure as with ether and other general anesthetics. Today ether is seldom used except in children where cooperation is not satisfactory for local anesthesia. But even in children with the preliminary basal anesthesia as avertin the procedure can usually be carried through under local anesthesia.

Case Reports

Case 1. — Wm. C., white, male, age 57. Admitted to St. Luke's Hospital, Jan. 2, 1939. Chief complaint was headache, speech difficulty and stupor. Patient was admitted in a stupor and the history was taken from his wife. Two months before he began having stuporous or unconscious spells lasting for several days. He has had

headache all of his life but severe headaches dated from the time of the stuporous spells. There was no history of paralysis of extremities associated with these attacks. No history of high blood pressure. During examination the patient remained in a stupor and there was no cooperation, nor would he talk. Blood pressure was 130/80. Head was essentially negative. Cranial nerves and eye grounds were normal, as were his pupillary reactions. There was seen a slight left lower facial weakness. Lobes of the brain showed by the history to present impairment of memory and disorientation. It was difficult to put the patient through different tests. No evident weakness of extremities. He was right handed and there was some speech difficulty. The reflexes showed the tendon jerks of the upper and lower extremities were active and equal. No pathologic reflexes, as Babinski's ankle clonus, were found, and the abdominals were active and equal. The laboratory data showed nothing of significance. The ventriculogram done on January 5, 1939, showed the third ventricle and a dilated left ventricle displaced to the left (fig. 1). The right ventricle failed to fill.

Fig. 1. — Case 1. Ventriculogram showing large dilated left lateral ventricle with shifting to the left. Deviated third ventricle to the left. The right ventricle is compressed. Case of Meningioma of the right sphenoid ridge.

Preliminary x-rays of the skull showed increased vascularity of the skull on the right side with a displaced pineal gland to the left. A diagnosis of right cerebral tumor, probable meningioma of the temporal region was made.

An osteoplastic flap was turned down on the date of the ventriculogram and a large encapsulated tumor was found situated beneath the right temporal lobe growing from the wing of the sphenoid. There was increased vascularity of the skull and of the dura. The dura overlying the tumor was involved, as well as the overlying bone. The large blood channels in the dura were satisfactorily controlled by electrocoagulation. The tumor was removed piecemeal by electrocoagulation and by the cutting current (fig. 2). The tumor was reduced in size by removing large pieces of tumor until finally the tumor was removed in its entirety. At its attachment to the floor of the skull the tumor tissue was curetted away and the remaining site was deeply coagulated to destroy any tumor cells remaining. The weight of the tumor removed was 155 grams.

The postoperative progress was satisfactory. The patient went through a period of aphasia in spite of the history of his being right handed. He was beginning to talk when discharged from the hospital one month later.

This is a benign tumor and the patient should remain well. The successful removal of this large tumor in one stage was entirely due to electrosurgery. Such a vascular tumor without satisfactory hemostatis would probably have been fatal in a one-stage operation.

Case 2. — M. M., age 52, white, female. Admitted to St. Vincent's Hospital, June 13, 1939. Chief complaint headache and general weakness. The present illness dates back three or four years when patient started having headache, worse on the left side. For the past six months she had fainting spells. No history of convulsions. She also had speech difficulty in the past six months.

On neurologic examination she was more or less stuporous and poorly cooperative. She was completely disoriented, with impairment of memory. She had difficulty in talking. Her blood pressure was 120/80. Head was negative. Cranial nerves showed eye grounds essentially clear without any abnormality of the discs. Pupillary reactions were normal. There was a right lower facial weakness and the tongue protruded slightly to the right. The patient gave a history of being right handed. There was definite aphasia, weakness and tremor of the right hand. There was also present forced grasping of the right hand. Reflexes showed that the tendon jerks of the upper and lower extremities were greater on the right side. No pathologic reflexes were seen. The laboratory data revealed nothing significant. X-rays of the skull showed nothing unusual except some slight erosion of the dorsum sellae.

Ventriculograms on June 15, 1939, showed displacement of the entire ventricular system downward and to the right, more pronounced in the frontal portion (fig. 3).

Fig. 2. — Case 1. Photograph of meningioma removed in pieces by use of electrosurgery from beneath temporal and frontal lobes.

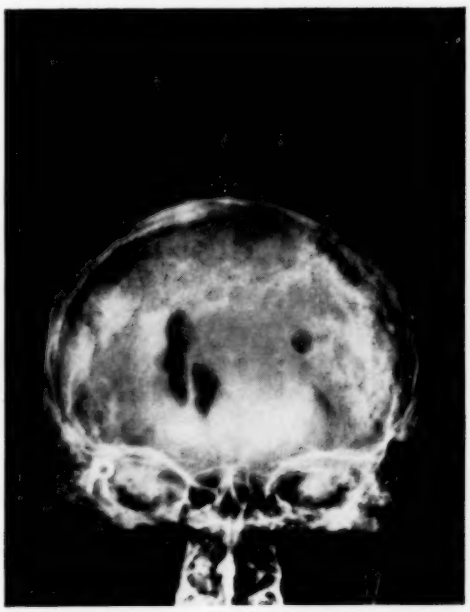


Fig. 3. — Case 2. Anteroposterior view of ventriculogram showing downward displacement of the left lateral ventricle and shifting of the ventricular system to the right, due to post-sagittal meningioma in the left upper frontal region.

An osteoplastic flap was turned down on the date of the ventriculogram. There was increased vascularity of the bone and meninges. A large tumor was disclosed in the upper frontal region near the midline (fig. 4). It invaded and was attached to the dura near the longitudinal sinus. There was slight invasion of the bone underlying it. The dura was opened widely around the tumor area and the vessels in the neighborhood were coagulated and the growth gradually lifted out of its bed and removed. There was little bleeding as all the larger vessels were preliminarily electrocoagulated. The dura in the region of the longitudinal sinus was heavily coagulated so as to destroy any tumor tissue cell present. Likewise the inner table of the skull overlying the tumor was curetted and coagulated. The tumor was 7 cm. in diameter. The pathologic report was meningioma. The patient improved nicely after the operation. There was a slight weakness of the right arm and leg, but this gradually improved. There was an increased aphasia which was improving on discharge from the hospital. She was able to be up and walking with help on her discharge from the hospital 17 days after the operation.

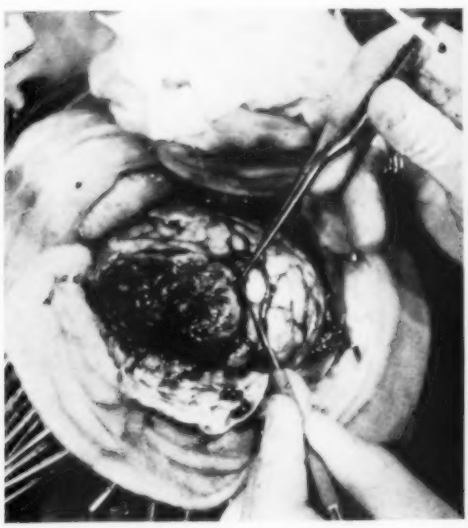
This was another tumor favorable for cure by its complete removal. It would have been impossible with such a large vascular tumor to get a pa-

A

Fig. 4. — Case 2, *A*, notice erosion and invasion of the inner table of the bone flap by the meningiomas as pointed out by the forceps.

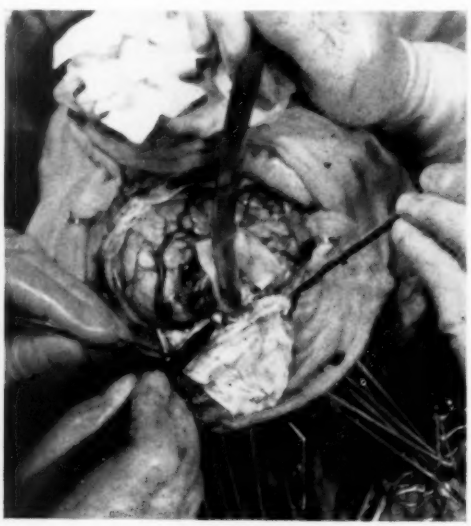
B

Fig. 4, *B*, encapsulated tumor embedded in the upper frontal lobe near midline is shown. The dura is dissected from the tumor with the cutting electrode.



C

Fig. 4, *C*, the peripheral vessels between the brain and dura are picked up with the forceps and electrocoagulated.



D

Fig. 4, *D*, the tumor has been completely removed and the dura in the region of the sagittal sinus is coagulated with the ball electrode to destroy tumor cells should any be left.

tient out of the hospital so soon and satisfactorily without the aid of electrosurgery.

Conclusions

1. Electrosurgery is indispensable in operations on the brain and spinal cord, and in all operations which the neurosurgeon is called on to perform.

2. Its principal benefit is in controlling bleeding and thereby lessening shock. Some of the most vascular tumors can be removed without a dangerous loss of blood.

3. The most help is obtained in removing meningiomas which as a rule can be accomplished in one stage with modern electrosurgery technic. All other types of tumor are also more satisfactorily managed with this method.

4. Experience and training are necessary in the proper application of electrosurgery to neurological surgery. The basic principles of neurosurgery have not changed by the advent of electrosurgery and the successful outcome of any case operated upon is dependent not upon any one instrument or device but upon the coordination of teamwork with experience in the application of many instruments.

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References

1. Clark, Wm. L.: The Dessication Treatment of Congenital and New Growths of Skin and Mucous Membranes, J. A. M. A. **63**:925, 1914.

2. Ward, Grant E.: Value of Electrothermic Methods in the Treatment of Malignancy, J. A. M. A. **84**:660 (Feb. 28) 1925.

3. Cushing, Harvey: Electrosurgery as an Aid to the Removal of Intracranial Tumors, With a Preliminary Note on a New Surgical Current Generator, by W. T. Bovie, Surg., Gynec. & Obst. **47**:751 (Dec.) 1928.

4. Davis, Loyal: Use of Electrosurgery in Neurological Surgery, Am. J. Surg. **9**: 207 (Aug.) 1930.

5. Sachs, Ernest: Various Uses of Electrosurgery in the Treatment of Brain Tumors, South. M. J. **25**:1013 (Oct.) 1932.

COLONIC IRRIGATION

Indications and Technic *

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Irrigation of the colon must have had its inception centuries ago even back to early Egyptian days when it was observed that the Ibus, sacred birds of the stork family, periodically, but with regularity, flew in droves to the sea, filled their beaks with water and gave themselves a lower bowel washing. From that ancient time to the present colonic flushing has been practiced in various forms and recently has become the subject of wide study, speculation and comment. The pendulum has swung from an extreme of enthusiasm to one of conservative criticism. As yet, little or no neutral ground has been reached. Thus, on the one hand we have such well founded opinions as those of Alvarez,[1] Donaldson[2] and others not only questioning any value attached to colonic lavage but pointing fingers of suspicion to actual harm associated with the process. Opposing these opinions are well-grounded and equally conservative physicians such as Bastedo,[3] Wiltsie,[4] Hibben,[5] and others. In the following presentation an effort is made to establish a clinical rationale for colonic irrigation properly carried out.

Despite the objections of those radically opposed to its use there is little question but that in the hands of experienced physical therapeutists colonic lavage has been the chief aid in restoring many diseased individuals to a normal state. The process receives much of its slander due to the fact that

* From the Department of Physical Therapy, James M. Jackson Memorial Hospital, Miami, Florida.

* Read at the Southeastern Sectional Meeting of the American Congress of Physical Therapy, Atlanta, Georgia, May 21, 1940.

clinicians have permitted it to fall into the hands of the unscrupulous and the inexperienced. Proper technic has, therefore, been sadly neglected, resulting in over-stimulation, over-distention, chronic irritation and other unphysiologic reactions.

Modern Developments in Technic

The long standing claim of many critics that colon irrigations not only are valueless but when frequently repeated harmful, may in a large measure, be attributed to faulty technic. This lamentable attitude is due to the circumstance that clinicians have entrusted the mechanical procedure to nurses, and even more to non-medical technicians, referring or assigning the patient into such hands with the meager order "colon irrigation." Personal supervision or further instructions concerning the existing clinical or physiologic conditions are lacking. The referring physician pays little attention to the operator's training in the therapy of the colon beyond that obtained during the regular course of nurse's instruction, which is little or none as evidenced by the curricula of virtually all training schools. We may even go further; it is a matter of observation that these very clinicians, including the critics, base their opinions on a swivel chair type of science. Their analysis of the final results precludes any knowledge whether one or two tubes have been used (a long garden-hose type of tube attempting to insert it into the cecum or a small tube inserted not beyond nine inches); whether or not the abdominal wall has been kneaded and pounded as is common with inadequately trained operators. To this should be added that no study is made of the return from each individual case under treatment. These remarks appear to be too drastic, but they are true. This is evidenced by the fact that, with the exception of the clinical disciples of this particular therapy, clinicians seldom, if ever, are seen during the operative procedure. Their instructions are vague except for ordering the colon to be irrigated, and it is indeed a rarity to find an order to collect and save for study the returned contents. Such technical indifference is almost unheard of with other physical procedures. Under such circumstances it is no wonder that the special reports of the operator regarding gas, mucus, ease or difficulty encountered with the irrigation mean nothing to the attending physician.

Technic in irrigating a colon at present has reached the same stage of accuracy as that of the determination of blood pressure. We no longer need resort to the judgment of those schooled in the technic of the older methods. The combined researches of physiologists and engineers have resulted in the development of an apparatus which, if kept within the regular profession and given personal attention renders possible a procedure both of therapeutic and diagnostic value. This apparatus* is equipped with a short non-irritating rectal applicator. A mercury manometer registering positive and negative pressure at all times is attached and reveals a mirror image, so to speak, of what is being encountered within the colon. An attached receptacle enables the operator to obtain specimens for analysis at any desired time, the remainder of the return flowing directly into the sewage system. This has outmoded the slop pail which had to be emptied at intervals, diverting both the operator from proper technic and the clinician from any chance at accurate observation. The incorporation of negative or vacuum pressure within the mechanical system prevents the old factors of over-stimulation, distention and irritation, both during and after treatments.

* The Dierker apparatus embodies the features here described. — Ed.

Indications

Under this caption we enter a field widely debated. The concept of auto-intoxication flourished under the sponsorship of Billings. The pendulum swung to the extent of actual resection of part or nearly all of the colon. Physiologists have shown that the dogmatic claim of selective absorption must be modified. Experiments in progress are confirming previous work, indicating that even in the face of complete intestinal obstruction the factor of mechanical distention is all important so far as systemic absorption is concerned.

When one considers that the generic term constipation involves problems of atonicity, hypertonicity, spasms, organic lesions producing reverse peristalsis, it is easily appreciated that one confronts a pathophysiologic problem complicated in nature. To this should be added a number of inflammatory processes for which colonic irrigation has proved of decided benefit.

In the hands of experienced clinicians trained and equipped with modern apparatus, diagnostic value as well as therapeutic results can be achieved during the same procedure. Under such management the various contributing factors to intestinal stasis can be determined and their correction better achieved by a series of irrigations than by laxatives many of which are claimed to act by mechanical stimulation or lubrication but interfere with proper intestinal function above the colon.

Mucous colitis has long been considered an indication for irrigation. If proper attention is paid to solutions used together with a non-irritating technic, this procedure is fully justified.

Many cases of infectious and hypertrophic arthritis are aided by an intelligent regimen which includes a number of colonic irrigations. Parasitic infectations are often amenable to treatment by irrigations with medicated solutions.

It may be stated that the indications for colonic irrigation are admittedly not specific: Like most other standard therapeutic procedures it must be considered along with other measures according to encountered conditions. Through lack of such consideration it has often been applied with little or no benefit. Colonic irrigation combined with infra-red or short wave therapy, proper diet, and general gastro-intestinal management is now beginning to reveal its value.

Conclusions

1. Proper technic administered by skilled operators is essential to good results from colonic irrigation.
2. The profession generally has been careless in supervising the use of this measure.
3. A suitable apparatus acts both as a diagnostic and a therapeutic device.
4. Indications in general are discussed.

References

1. Alvarez, W. C.: The Mechanics of the Digestive Tract, New York, Paul B. Hoeber, 1938.
2. Donaldson, A. N.: Relation of Constipation to Intestinal Intoxication, J. A. M. A. **78**:884 (March 25) 1922.
3. Bastedo, W. A.: Colon Irrigations; Their Administration, Therapeutic Application and Dangers, J. A. M. A. **98**:734 (Feb. 27) 1932.
4. Wiltsie, J. W.: Chronic Intestinal Toxemia. Baltimore, Wm. Wood & Co., 1938.
5. Hibben, John S.: Corrective Technic in Colon Therapy, Arch. Phys. Ther. **18**:342 (June) 1937.

Discussion

Dr. Kenneth Phillips (Miami, Florida): To me it is quite evident that the main purpose of this paper is to stimulate thought along this line of therapy. In the short space of time allotted him I think this has been well accomplished. The essayist need not apologize for being too drastic, for he has spoken the truth. Medical men have for years not only permitted untrained and inexperienced operators to administer irrigations of the colon but they have shown a total indifference to the technic in not even observing the procedure being carried out. We must not forget as the essayist has stated, that nurses do not receive proper instruction in colonic therapy during their training. There are but a scant few training schools which include physical therapy in their curricula. We, therefore, cannot expect them to be left with this responsibility. Many times we refer patients to technicians not even trained under competent medical men. In the majority of cases the referring physician has no idea of the pounding and massaging inflicted upon the abdomen by the operators. More astounding is the fact that the end results of such a set-up constitute most of the evidence upon which these very clinicians base their opinions and become critics of the whole regimen. This undoubtedly has stifled scientific progress in this field.

I do not think the presentation has in anyway overemphasized the boomerang we are beginning to feel from promiscuous and over-prescribing of the many patented oils, agars, agar-oils, etc. McLester and others are beginning to show the deleterious effects in the form of deficient absorption, avitaminosis and other upsets resulting from these products. Colonic therapy needs much revision. Conventional ideas must be modified. Physical medicine is surely going to play a large part in that revision.

Dr. W. E. Bippus (West Palm Beach, Fla.): Dr. Cline has drawn our attention to a very important problem. I heartily agree with his condemnation of the indiscriminate use of colonic irrigations by poorly trained persons.

Irrigation of the intestine is particularly indicated in the following conditions:

1. When there exists at the same time constipation and intestinal auto-intoxication characterized by high curves of the aromatic bodies.
2. When there is a considerable degree of autointoxication, even though there are but few membranes and the stools are regular.
3. When enteritis is accompanied by much mucus.

Badly done irrigations distend the intestine and increase its atony; if too great a pressure is used they will increase the spasms. Repeated too frequently they irritate the bowel and exaggerate the mucus secretion. If the irrigations are too hot, cold or irritating they provoke an artificial membranous enteritis.

As Langenhagen once said: "It is more due to the manner in which the lavage is done than to the procedure itself." If irrigations are performed with the indicated precautions most of the disadvantages disappear, but it is still true that they should not be abused. It is necessary to know when to prescribe irrigations, at what intervals they should be made and stopped when the indications disappear. So far as the indications I have stated are concerned, irrigations of the colon properly carried out have proved of unquestionable value.

A SIMPLE DEVICE FOR FORCED FLEXION OF THE KNEE

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It is frequently necessary in treating a patient with fibrous ankylosis of the knee to introduce and encourage forced flexion. Manual flexion of the knee in such instances is extremely difficult. It seems practical to provide a fulcrum which can be placed beneath the popliteal space and a means of fixation of the feet so that the patient might apply forced flexion by the weight of his own body.

Attention is therefore called to a simple device (fig. 1) that has proved to be most satisfactory at the clinic. It will be noted that it can be fitted into an ordinary doorjamb (fig. 2). It consists of a board, as illustrated,

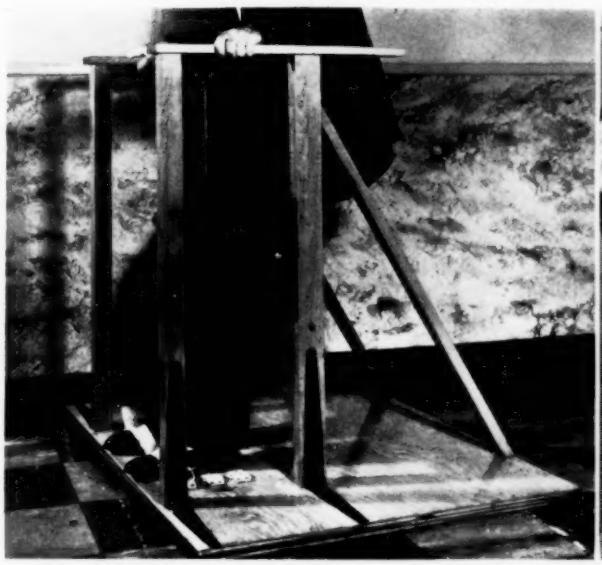

Fig. 1.

Fig. 2.

Fig. 1. — Simple device for forced flexion of the knee, type which is constructed on a movable framework.
Fig. 2. — Simple device for forced flexion of the knee, illustrating the extremely small space it requires.

which is laid on the floor or firmly fixed between the sides of the doorjamb. A rod at right angles to the long axis of the board holds a strap in place. Three buckles attached to the sides of the board provide for various positions of the strap. The strap may be shortened or lengthened across the toes by adjusting its length through the buckle. Two metal strips with flanged holders at various heights are attached to the sides of the framework or door at a height sufficient to adjust to a short or long lower leg. Five different heights are provided, and a polished metal bar can be set on the flanges at the required level. A pillow or pad may be laid across the bar to protest the back of the knee, if desired. At shoulder level are placed two rails of wood or, for the door, two handles made of ordinary pipe fittings which provide the patient with proper support during forced flexion.

As can be seen, the patient merely places his toes under the properly adjusted strap, has the bar adjusted to the proper height beneath the back of the knee, grasps the two handles and flexes his knees over the bar, which acts as a fulcrum.

ESOPHAGEAL DYSFUNCTION TREATED WITH SINUSOIDAL CURRENT

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NEW YORK

There is hardly any problem in medicine that is more controversial than the condition commonly referred to as esophagospasm, as is evidenced by the literature. While the esophagus readily lends itself to anatomic study and physiologic research, this viscus presents many perplexing problems. Authorities are not unanimous regarding its innervation, physiologic mechanism, alterations in function and even its very anatomic structure. This in part explains also a widespread disagreement in the nomenclature.

Naturally there is a wide and disconcerting diversity of opinions concerning the effects of electrical stimulation of the nerve supply of the esophagus. This is explainable by its many reflex arcs connected with the central and the peripheral nervous systems, as well as with segments of both near and distant parts of the gastrointestinal tract and the adjacent respiratory and cardiovascular systems. It is essential to bear in mind the maze of somatic interrelationship, which in many respects resembles the equally complicated problem of the endocrine system. All this tends to present great difficulties in spite of meticulous efforts to determine the site and nature of the many factors involved in functional disturbances of the esophagus, easily diagnosed as such. Under the circumstances any attempt to correlate all concerned factors and to suggest a method of treatment which while not new in principle has proved effective in the relief of sufferers from functional disturbances of this viscus may appear as rather presumptuous. However, the importance of the problem justifies such an effort, which necessitates a brief review of past reported experiences in this field.

Historical Note

Guillemin[1] asserted that Eugene Hoeckel, of Strassburg, in 1876, was the first to resort to electrolysis for esophageal stenosis. Aaron utilized this method in cicatricial strictures, for which he devised an electrode placed in a stomach tube. Guillemin states that Flouquet, in 1900, obtained better results from linear than from circular electrolysis. Bassler[2] modified the commonly used electrode by giving its terminal the shape of a globe. Guisez[3] abandoned operative intervention in favor of circular electrolysis under endoscopic control, a procedure later supported by Bruzzi.[4] Experiences with galvanism, occasionally aided by faradism were reported at different times by Abel,[5] Thurzo,[6] Welcker,[7] Rouneaux,[8] and others.

Porcher,[9] divided esophageal dysphagia into cervical, thoracic and abdominal types, advised ionization for the first, electrolysis for the second, and mentioned no treatment for the third group.

As regards the high frequency current, Besaude,[10] credits its discoverer, d'Arsonval, with having been the first to recognize its value in gastrointestinal affections. Cluzet and Chevallier[11] utilized this current to produce neuromuscular excitation by polarization. Morse[12] described the heat effects of the high frequency current through tissue resistance, and Grandauer[13] later utilized it in the treatment of cardiospasm. Cluzet and Ponthus[14] claimed superiority of this current in the production of isolated muscular contraction or tetanization.

Jones[15] described the effects of sinusoidal currents in respect to muscular stimulation. He showed this effect also in smooth skeletal muscles deprived of their nerve supply.

The writer advocates the use of the sinusoidal current because, as Waddington[16] states, it produces a sensory response superior to that by galvanism and, in addition, is applicable to produce non-volitional, smooth, and rhythmical contractions and relaxation of muscles. In cases where nerve regeneration is needed, treatments may be alternated with the intraesophageal application of the galvanic and, when desired, the alternate current. This produces the desired polar, thermal, and physiologic effects.

A later contribution by Brunner[17] deals with remarkable results in dysphagia and cardiospasm in a large series of cases by a combination of diathermy and ballooning of the esophagus with a specially devised instrument.

Apparatus

The sinusoidal apparatus used by me is that devised by Dr. Jerome Weiss. It has the advantage of offering a safe, constant flow of current and, what is perhaps most important in this type of therapy, it is devoid of any noise. The sinusoidal current is not measurable like the galvanic current, but a calibration on the dial serves as a fairly reliable guide to current intensity. The latest model is equipped with a micro-control which permits a particularly fine adjustment of the current, as described by Weiss.[18]

The applicators I use are, in principle, those employed by most workers, but have been modified by Geo. P. Pilling & Son to overcome some of the shortcomings of this equipment. Essentially they consist of a central metal cable made of a flexible, closely coiled spring sheathed in rubber tubing. The proximal end has a female slip-joint to fit over the male end of the connecting post of an intermediate conducting cable, which is attached to the binding post of the Weiss apparatus. At the distal end of the electrode the spring cable is left exposed for six inches, which part comes in direct contact with the mucosa when the electrode is introduced to the proper level of the esophagus. The metal tip of the electrode has a slightly bulbous shape tapering to a point. The diameter of the electrode corresponds to that of the duodenal tube, has a length of 28 inches, and allows adequate play between the patient and the apparatus.

Another, so-called hiatal electrode, is of similar construction, but terminates in a conical soft rubber tip, one inch in length, with the coil spring between it and the distal end of rubber sheathing, the metal coil intended for contact with the mucosa of the esophageal hiatus. This arrangement obviates unnecessary, painful sensations in the epigastrium that are produced when metal tips enter the cardia. The hiatal electrode is more thickly insulated, with four inches being left exposed for contact with the viscus. This electrode is six inches shorter than the type described above, and with its thicker covering facilitates introduction into the hiatus.

Indications and Contraindications

The cases suitable for treatment with the sinusoidal current may be grouped as functional or organic in nature.

Functional Types. — All cases generally conceived as dysfunction of the esophagus embrace such conditions as globus hystericus, pharyngospasm, and esophagospasm at any esophageal level. These may be grouped also as: cardiospasm, preventriculosis, phrenospasm, ingluveosis, achalasia, and functional hiatal stenosis.

The Jacksons[19] regard globus hystericus as an organic (?) affection ascribable to spasmodic contraction of the inferior constrictor of the pharynx,

and not to "hysteria of the esophagus." However, for the purpose of therapy the above list of affections may be regarded as functional in nature.

Organic Types. — Since most if not all organic lesions of the esophagus produce functional disturbances, they also may be subjected to direct sinusoidal treatment, provided the etiologic factors have been eliminated or alleviated to permit safe introduction of the esophageal electrode.

The principal lesions with which we are here concerned are: esophageal stenosis caused by the ingestion of caustics, ulcerations of all types, acute infectious esophagitis, and idiopathic dilatation.

Contraindications. — Impermeable stenosis, until sufficiently relieved to enable the passage of an electrode. Ulcerations, unless they have first healed. Malignant growths. Benign growths, until they have been removed or reduced. Large, individual diverticula, while multiple, small, saccular diverticula may be given the treatment with benefit. Varices, because of the danger of producing hemorrhage. To these topical conditions should be added the contraindications in the presence of severe cardiac disease, renal affections, advanced tuberculosis, high blood pressure, and esophageal affections associated with peptic ulcer in the early stages. In general the contraindications to operative therapy apply also to topical treatment with any electrical current.

Therapeutic Technic

Preparation of Patient. — Patients with organic lesions should have proper preliminary instrumental treatment for the kind of lesion present. The esophageal canal must be readily passable by a small Jackson soft woven-tipped bougie before intraesophageal electrotherapy is attempted.

Neither food nor drink should be allowed after the evening meal preceding the morning of treatment, allowing at least 12 hours for the esophagus and stomach to be free from fluid or solid food. In cases with severe spasm, a not inconsiderable amount of saliva, and in patients with sinusitis, nasal secretions may collect during this period in the lower esophagus which occasionally interfere with the treatment. Usually, however, the patient regurgitates this during the first few attempts to introduce the electrode.

Experience has shown that the morning before the patient's usual breakfast hour (7:00 to 10:00 A.M.) is the best time for treatment. Night's rest, induced if necessary by a hypnotic, is conducive to the patient's helpful cooperation, in addition to which, the empty stomach avoids nausea which occasionally interferes with the smooth progress of the procedure. Rarely is it necessary to spray the throat with a mild local anesthetic. I have found that spraying the pharynx with 1 or 2 drams of 2 per cent Larocain is very efficacious.

Preparation of Apparatus. — The conducting cable should be connected with one of the binding posts of the Weiss machine marked "Patient" and, in turn, its distal end attached to a pad electrode well moistened with salt solution. This is applied to the flexor surface of the patient's right wrist. Another conducting cord is attached to the other slip-joint and its distal end connected with the proximal end of the intraesophageal electrode.

Then the main switch in the upper left hand corner, marked "Sin." (Sinusoidal), beneath the red pilot light is moved to "On."

The switch marked "Selector" is moved from the "Off" mark to "SS" (Slow Surging Sinusoidal Current). Then the switch beneath the arrow marked "Sin." (Sinusoidal) is moved very slightly in the direction of the arrow. With each impulse of the current the red light above will appear, and between impulses, disappear.

Determining Preliminary Strength of Current. — After the few moments necessary for the red light to alternately appear and disappear, and with the wet pad attached to the patient's wrist, lightly apply the metal tip of the intraesophageal electrode to the edge of the patient's tongue, and if the current is not felt, move the switch marked "Sin." a few millimeters further in the direction of the arrow. Try this a few times until the patient feels the current lightly, never to a painful degree. This is the strength of the current with which the first and every subsequent treatment is started.

Having determined this, the esophageal electrode is passed through the oral cavity to the hypopharynx to the right esophageal introitus (right sinus pyroformis), much as one passes a stomach tube. This step is subject to the same reactions of the patient as that attending the passage of a stomach tube. Nervous or "gaggy" patients may be somewhat difficult, but even in these, after the first successful treatment, very little subsequent difficulty is met with, providing that the current at the beginning of each treatment is the least amount the patient can feel at the edge of the tongue when preliminarily tested.

For the first few treatments it is good practice for either the physician or the nurse to hold the intraesophageal electrode (after it has been introduced to the proper level of the cricopharyngeus muscle) at the patient's lips. The *main* switch must be turned on before passing the electrode, but not the "Sin." (Sinusoidal switch).

When the distal end of the electrode is at the cricopharyngeal level, turn the sinusoidal switch on to the same position on the arrow at which the patient first felt the current on the trial touching of the tongue.

After about a dozen flickerings of the red light, if the patient feels this mild degree of current, allow the electrode to remain in this position for ten light impulses. If the patient does not feel the current, the "Sin." switch should be moved a few millimeters further on, and after 10 to 15 impulses of the red light noted before passing the electrode tip down 2 inches further to the next lower esophageal segment.

Here again allow 10 to 15 red-light impulses to occur at the same position of the "Sin." switch before passing the tip of the tube to a point another two inches below. Thus, in advancing the tip gradually from one higher level to the next below, after permitting 10 to 15 impulses to occur at each level, one imitates the normal rhythmic cycle of swallowing and esophageal muscle action and helps to re-establish the natural esophageal rhythm.

If, after following these directions, the sinusoidal current contractions are not felt by the patient at any segments of the esophageal canal, it may require 3 or 4 subsequent similar treatments carried out in the same way before the esophageal innervation is sufficiently stimulated to react to the current.

Patients requiring additional forms of therapy, such as bouginage through the esophagoscope or by other means, should not have this given on the same day as the intraesophageal treatment, but on intermediate days.

Method of Using the Hiatal Electrode. — When preliminary diagnostic study reveals a true state of spasm at the hiatal level, whether one calls it phrenospasm, cardiospasm, or preventriculosis, and when fluoroscopy plus roentgenography with a small amount of barium mixture shows that the spasm occurs definitely at this level, and no other lesion is discernible at any of the upper levels, the intraesophageal electrode is of especial value, either alone, or as above mentioned as an adjuvant to the various instrumental measures on alternate days.

The same preliminary preparation of the patient is necessary, and when ready, the hiatal electrode should be passed gently, but at once, down into the diaphragmatic opening so that only the rubber tip will protrude into the gastric cardia. Here the treatment is begun at the same strength as mentioned above, utilizing the smallest amount of current that the patient feels when the metal portion of the distal end is placed against the lateral border of the tongue.

Twenty contractions of the hiatus with the slow sinusoidal current suffice for the first treatment even if the patient experiences no sensation of contraction. Subsequent treatments are increased in strength as above stated, as is the duration of the treatment. Increase the number of contractions by five per treatment, and gradually the strength of the current. Fifty contractions are the maximum number for any single treatment. More than this may produce a troublesome muscular atony which will only add to the patient's difficulties. Never use a current strength that is painful to the patient, no matter how weak the current may be. If at all painful, the current should immediately be reduced to an intensity that is easily tolerated.

One can visualize the powerful reflex diaphragmatic muscle contractions on using a greater amount of current as proof of its effect upon the esophageal musculature by noting rhythmic contraction and relaxation of the patient's abdomen at the epigastrium.

The uselessness of externally applied currents (surging sinusoidal or any other form), upon esophageal muscles is proved by placing a small amount of thick barium mixture in the lower end of the esophagus in true cases of hiatal spasm, and noting fluoroscopically that with these currents contractions occur of insufficient strength to force food through the hiatus into the stomach. On the other hand, with the sinusoidal current, not only does a contraction of sufficient strength occur on first contact, but is followed by a definite relaxation of the diaphragmatic crura, the hiatal sphincter when present, and by the rapid discharge of the barium mixture into the stomach.

Additional Suggestions and Observations. — During the passage of electrode, or even during the treatment, some patients are subject to a great increase in salivary secretion which may collect in the throat and obstruct respiration. Even with the electrode held in place by the operator, by reassuring the patient and asking him to bend his head forward and to "spit with his lips," the excessive secretion may be expelled without removing the instrument. Occasionally, it may be necessary to withdraw the instrument, have the patient clear his throat, and reintroduce the electrode.

Again, some patients will have a regurgitation of excessive gastric secretion, which also seems to be stimulated during this treatment. Here, too, the above advice is of value.

In patients prone to excessive salivation, a preliminary hypodermic injection of atropine sulphate (gr. 1/150) 15 minutes before the introduction of the electrode, will suffice to prevent this disturbing complication.

Occasionally a considerable amount of mucus will collect in the esophagus, surround the distal end of the instrument, and seem to act as an insulating material. In such instances, when at previous treatments contractions were felt at the same region, and with the same amount of current, it is wise to remove the electrode, have the patient swallow or expectorate, and reintroduce the instrument.

In cases of long standing, such as partial paresis of the musculature of the esophagus, or a greatly dilated esophagus with attenuated muscles, the improvement obtained may be lost between treatments. In such situations,

usually after a few more treatments improvement will be again noted and such relapses become less frequent.

Increasing the Strength of the Current. — As stated above, no accurate gauging of the strength of the current has as yet been devised for the sinusoidal current. Experience has shown that as one moves the "Sin." switch gradually toward the arrow-point, the patient feels the increase in the current as evinced subjectively by the patient's sensation of more severe contractions of the esophagus, and objectively by visualizing the increasing contraction of the supraclavicular muscles.

The average amount of current increase in each successive treatment should not be more than about 4 millimeters along the arrow, and this also should be increased only gradually. I have found that it is convenient to arbitrarily divide the esophagus into four segments of equal length, taking the cricopharyngeal region for the first segment, the hiatal (diaphragmatic) segment as the fourth segment, and in considering the intervening, respectively, from above downward, as the second and third segments. After treating the first, or cricopharyngeal segment with 10 to 15 contractions, the tip of the electrode is advanced about two inches downward for the same number of contractions; likewise permitting the same number of esophageal contractions to occur in the third and fourth segments at the same strength as the first, and advancing the electrode the same distance at each of the remaining three segments, namely, 2 inches.

After the completion of treatment, the current is first turned off at the main switch before withdrawing the electrode. The patient is advised not to eat or drink for at least one hour.

A very interesting observation was occasionally made in a large number of patients, that while the electric impulse was felt at some levels, it was not at other levels. This gives rise to the hypothesis that certain segments of the esophageal innervation were in either a very low state of excitability, or that such excitability was entirely absent, as, following a number of subsequent treatments, almost invariably the electric excitability apparently soon returned to normal.

Frequency of Treatment. — Prompt response of the esophageal neuromuscular structure is felt subjectively by the patient as a definite contraction at the level of the esophagus at which the tip of the electrode is placed. With the improvement in esophageal function between the treatments, and the reduction in number and frequency of attacks of esophagospasm, two treatments weekly, three days apart, suffice.

In severe cases, those requiring a number of treatments before any current is felt or in which the contraction accompanying the application is very faint or barely perceptible, the treatments are given every other day for 10 to 15 contractions. When these are definitely improved as shown by reduction in spasm and improvement in swallowing, the intervals are lengthened, much as in a course of treatment by galvanism or faradism to paralyzed skeletal muscles — twice a week, once in 5 days, once a week, and the like.

In certain highly nervous patients in whom various types of psychogenic esophagospasm are more prone to occur, and who are frequently subject to hyperesthetic throats, pharyngospasm, globus hystericus, gagging, or vomiting, which interfere with a smooth introduction of the electrode, a preliminary dose of phenobarbital or similar sedative is helpful.

Occasionally, especially in the first few treatments of the very nervous types, it may be even necessary to use a small amount of a local anesthetic in the hypopharynx. For this purpose I have found a 3 per cent solution of larocain most valuable. One-half dram sprayed into the hypopharynx 15

minutes before passage of the esophageal electrode is most efficacious, being practically tasteless, and in my hands has proved absolutely free from any undesirable after effects.

However, even in these difficult conditions, after one or two treatments, most patients will become fully cooperative, especially in those long-drawn cases which have resisted almost every type of treatment including ordinary trans-esophagoscopic bouginage or the types of dilators mechanically operated by air, water, or mercurial pressure.

Adjuvant Treatment. — It is emphasized that this method is not a pancea for esophagospasm, and if used in organic esophageal dysfunction without proper previous treatment, no lasting benefit will be obtained. Thus stenosis of the esophagus, from whatever cause (inflammatory, ulcerative, or traumatic) must receive appropriate treatment as a preliminary to direct intraesophageal electrotherapy. On the other hand, used as an adjuvant with and following other treatments, a gratifying and prompt return of the tonus of the esophageal musculature and thus a more early perfect functioning of the gullet is obtainable.

For the psychogenic, neurogenic, and hysteric types of pharyngo-esophageal dysfunction this form of treatment is excellent without the need of other instrumental or drug therapy.

Summary

Disturbed esophageal function is manifested symptomatically in both the absence and presence of gross organic lesions.

Both types are accompanied and frequently followed by an altered esophageal muscle rhythm.

This may be expressed either as a spastic or an atonic condition.

In certain cases of neurogenic origin, areas of both atonicity and spasticity may be coexistent.

The surging sinusoidal current has proved of marked therapeutic value in the psychogenic, neurogenic, and "so-called" functional esophageal diseases.

Functional disturbance also accompanies and frequently is a sequelae of gross esophageal pathologic lesions.

Following the relief of the mechanically irritating or obstructive lesions, the surging sinusoidal current rapidly assists in restoring normal muscular tonus and the rhythmic deglutitory cycle.

A description of a safe apparatus generating this current is given, as well as of the intraesophageal electrodes and their manner of application.

There are a few contraindications similar to those ordinarily encountered in bronchoscopy or esophagoscopy.

It is a safe method and may be used alone or as an adjuvant to other accepted methods of treatment for the various spastic conditions to which the gullet is subject. In addition to the usual methods of treatment by bouginage, my method reduced the number of bougie dilations needed when the latter treatment alone was used, and recurrences were much less frequent.

References

1. Guillemin, G.: Des stenoses cicatricielles spontanees de l'oesophage, These de Paris, 1910, 1911.

2. Bassler, A. A.: A New Intragastric Electrode, J. A. M. A. **1**:1422 (May 7) 1908.

3. Guisez, eJan: Traité des maladies de l'oesophage, Paris, 1911.

4. Bruzzi, Bruno: Patogenesi e trattamento delle stenose cicatricielle, Arch. ital. di otol. Supplement 1, 1923.

(Continued on page 494)

ROENTGEN THERAPY IN OTORHINOLOGY *

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Roentgen therapy is now recognized as a valuable aid and should be employed as an adjunct in the routine care and treatment of certain otorhinologic conditions. Until recently irradiation was employed only in malignancy and in extreme or moribund cases when other forms of treatment failed or were of no avail. But today, it has a distinct place in the otorhinologic armamentarium on well founded clinical and scientific bases. Irradiation, however, is not a panacea and is not effective in all cases. X-ray therapy is frequently instituted haphazardly or empirically in unsuitable conditions, so that the end results naturally are unsatisfactory. However, if employed rationally in selected cases with the complete cooperation between the roentgenologist and the otorhinologist, so that results and controls may be evaluated, irradiation proves of definite therapeutic value.

We shall therefore discuss roentgen therapy generally as an adjunct in the routine care and treatment of the following conditions:

1. Cellulitis of the external auditory canal.
2. Eczema of the external auditory canal.
3. Erysipelas coincidental with mastoiditis.
4. Deafness of the conductive type due to lymphoid tissue about the eustachian orifice.
5. Acute suppurative otitis media.
6. Acute mastoiditis.
7. Chronic suppurative otitis media.
8. Otorrhea following radical mastoidectomy.
9. Cellulitis or furunculosis of the ala-nasi.
10. Sinusitis:
    - (a) Acute — Hypertrophic.
    - (b) Chronic — Atrophic.
      Hyperplastic.
        1. With polyps.
        2. Without polyps.
    - (c) Allergy.
    - (d) Rhinorrhea.
11. Adenitis.

Otologic Conditions

Cellulitis of the External Auditory Canal. — With few exceptions, all cases of cellulitis of the external auditory canal are managed in the conventional manner, irradiation being employed in conjunction with routine treatment. We invariably apply an anti-pruritic, such as picric acid (1 per cent aqueous solution) so as to alleviate the unbearable itching. The ear is painted directly with 100 per cent silver nitrate (Pearl) followed by infra-red for about 20 minutes, the approximate distance being 20 inches. Tamponage of the external auditory canal with ichthyol and belladonna ointment, 10 per cent glycerite tannin or a 2 per cent silver nitrate solution is employed.

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The interesting feature about irradiation is that the periauricular adenitis and pain often subside within a few hours. Of course, there have been cases where the pain persists despite the exposure which necessitates some form of sedation. I have found that the following factors were sufficient to ameliorate the symptoms: 89 kv. 5 ma. 14″ target skin distance (STD), no filter, 100 r.

Incidentally, it should be borne in mind that recurrent cellulitis and furunculosis may have a basic cause for their occurrence and recurrence, such as diabetes, hypothyroidism and various other metabolic or glandular disturbances, for which reason a rapid therapeutic success should not distract us from seeking the underlying cause.

Eczema of the External Auditory Canal. — We are all aware that eczema of the external auditory canal is an acute or chronic disease of the skin due to many causes. Allergy, metabolic disorders, or adjacent infections of the skin and scalp seem to influence the development of the disease. When eczema is due to suppuration of the middle ear or to various local medications, it belongs in the province of the otologist. Otologists see many cases of eczema of the canal in which itching is the most pronounced symptom, without evidence of suppuration.

We have found that local applications, i. e., astringents and antipruritics in conjunction with roentgen-ray therapy (89 kv. 5 ma. 14″ STD, no filter, 100 r) every six days for about 6 treatments tend to alleviate the unbearable pruritus and aid in clinical improvement. Dermatologic measures directed to concomitant skin infection should be carried out.

Erysipelas Coincidental with Mastoiditis. — Erysipelas coincidental with mastoiditis, preoperative or postoperative, does not materially differ from the same lesion in other parts of the body. It rarely remains localized and has a tendency to spread to the face and scalp.

This type lesion usually is very responsive to the roentgen ray. In many instances a dermatitis of this type will make a very satisfactory recovery within twenty-four hours after irradiation and, if new erysipeloid areas develop, further treatment and irradiation should be continued. I have found that 150 r over the infected area daily will produce a favorable result. As an adjunct I also administer sulfanilamide in physiologic doses.

Conductive Deafness. — Conductive deafness, due to lymphoid tissue about the eustachian orifice or to hypertrophy or hyperplasia of the mouth of the eustachian tubes (in the region of the epipharynx) responds well to roentgenotherapy. It is essential beforehand to determine the cause of the lymphoid tissue, particularly after adenoidectomy.

Recently I found malignancy in three such cases and the diagnosis was confirmed by biopsy. Incidentally there was a temporary improvement in hearing during the recession of the growth. On the other hand, lymphoid hypertrophy may also be due to recurrent or chronic suppurative sinusitis causing irritation of the pharyngeal tissue with resulting hypertrophy or hyperplasia. Accordingly, the deafness is due to an encroachment and partial closure of the eustachian orifice (soft tissue).

With the employment of the following factors, 135 kv. 5 ma. 14″STD 1/4 cu 150 r, once weekly for about eight treatments, very definite improvement of hearing was noted.

Acute Suppurative Otitis Media. — In my experience x-ray therapy has no value in the treatment of acute suppurative otitis media. I have experimented with a number of cases of bilateral suppurative otitis media with unilateral x-ray therapy while the opposite side was treated in the usual manner. Roentgenotherapy had no apparent effect on the progress of the

affection. In fact, the ears treated by accepted methods responded well, resulting in a "dry ear," while in a number of instances where the ears were treated with x-rays they terminated in surgical mastoiditis. I therefore reject roentgenotherapy of acute suppurative otitis media.*

Acute Mastoiditis. — Roentgen therapy in acute mastoiditis has a limited field. Only selected cases are suitable and respond to this type of treatment. Caution should therefore be exercised. It may be employed without danger in coalescent mastoiditis and in the pneumatized temporal bone, provided there is ample drainage.

Roentgenotherapy is of no value in type III pneumococcic mastoiditis, or in mastoiditis superimposed upon a diploic mastoid process.

Chronic Suppurative Otitis Media. — Chronic suppurative otitis media not due to bony necrosis but the result of an overgrowth of granulation tissue often responds to roentgenotherapy where other rational measures have failed. Tight packing and drying dusting powder, in conjunction with 50 r to the infected ear twice weekly for two or three months, depending upon the response, will bring about a satisfactory termination.

Otorrhea Following Radical Mastoidectomy. — From the patient's point of view, success can only be determined by a resultant dry ear. From the otologist's point of view, cessation of aural discharge following a radical mastoidectomy is not an indication of success or failure; it is nevertheless an objective to be attained. Roentgen therapy has produced a cessation of the tympanic suppuration following radical operation when the conventional methods have proved ineffective.

The peculiarity of the anatomic and histologic structure of the temporal bone and of the middle ear often lends itself to a persistent otorrhea, despite an excellent technical operative exenteration of the diseased process. The principles of the treatment of persistent otorrhea following mastoidectomy are not unlike those employed in chronic suppurative otitis media. The otologist frequently objects to a radical procedure on the ground that the patient, by necessity, will be forced to continue treatment for the persistent discharge following operation.

Roentgenotherapy in such conditions succeeded where other treatments have failed. The technic suggested and carried out by Dr. Barton Young of the Department of Radiology at Temple University, is as follows: He uses a dosage of 50 r to the ear twice weekly for two or three months, depending upon the results. A small area is selected and the rays directed at the external auditory meatus, the dosage being 160 kv., 50 cm. target skin distance, 1/2 mm. cu and 1 mm. al. filter for two and one-half minutes.

The results of this therapy may be due to the direct effect of the rays upon the newly formed granulation tissue. It is Nature's law that the more the structure approaches the embryonic type, the greater will be the response to irradiation. That the roentgen ray destroys the embryonic tissue, i.e., newly formed granulation tissue is established, and explains the success in producing the so-called "dry ear."

Comments

The formation of fibroconnective tissue is Nature's method of healing. This is accomplished by endothelial outgrowths with capillaries, venules and arterioles, bringing blood to the part; followed in turn by the polyblasts of Maximow, round cell infiltration, collagen, fibrillae, fibroblasts, and finally fibrous connective tissue. Granulation tissue is an overgrowth of fibrocon-

* When an acute suppurative otitis media responds to irradiation it is due to the effect of the rays upon the lymphoid tissue around the eustachian tube, resulting in its patulence. This in turn creates drainage of the middle ear, rather than producing a direct effect upon the otitis media.

nective tissue. Since it is Nature's method to heal by fibroconnective tissue, we are confronted by a peculiar paradox from an otologic standpoint. On one hand, we have Nature's method of healing the middle ear following radical mastoidectomy, that is by fibroconnective tissue; on the other hand, we have man's endeavor to perform various aural plastic operations consisting of flaps and grafts in order to facilitate epidermatization, so as eventually to cover the entire middle ear with ectodermal tissue.

As was stated, there is a biologic struggle for supremacy between the ectodermic and mesodermic tissue formation after radical mastoidectomy. When there is an ingrowth of ectodermic tissue, i.e., epithelial tissue covering the middle ear, we invariably obtain a dry ear. Should the mesodermic tissue become the potent factor, one is confronted with polyps and granulation tissue. These elements defeat our purpose. Therefore, we cannot expect, nor will we obtain a dry ear, which depends upon epidermatization, unless the granulation tissue is permanently destroyed.

The x-ray has a peculiar affinity for embryonic tissue and the dosage has been so definitely established that we can destroy the embryonic granulation tissue without disturbing the epithelial ingrowth. The newly formed epithelium is not as sensitive to the roentgen ray because it is an outgrowth from a parent mature cell budding from the skin graft flap. It is logical to conceive that Nature favors squamous epithelium of ectodermic origin to protect the tympanic cavity.

It has merely to be considered that (1) the outer part of the ear drum is covered with squamous epithelium, and (2) in chronic suppurative otitis media with large central or marginal perforations, there are epithelial ingrowths into the tympanic cavity which produce the well recognized matrix, so splendidly described by Nager. This matrix is ectodermic in origin and when properly preserved can be utilized as a base for epidermatization. Otologists take note of this tendency and utilize various plastic methods to aid in epidermatization of this important cavity.

I wish to emphasize that roentgen therapy is merely an aid in treating selected cases of acute suppurative otitis media, chronic suppurative otitis media and otorrhea following radical mastoidectomy.

Rhinologic Conditions

Cellulitis or Furunculosis of the Ala-Nasi. — Cellulitis of the face and nares is a dangerous and treacherous condition, particularly if early surgical interference is instituted before the process has become localized. It is not uncommon for this malady to terminate in cavernous sinus thrombosis, septicemia or meningitis. I have seen four cases terminate in cavernous sinus thrombosis.

At the present I attempt to abort or localize the infection by applying 100 per cent silver nitrate (Pearl) to the infected area in conjunction with irradiation. I have found that 100 r is more likely to yield a favorable response than a larger dose. The factors employed are: 89 kv. 5 ma. 14″ skin target distance, no filter, 100 r. It sometimes aborts the infection following exposure, helps to relieve pain and facilitates drainage. It causes no skin damage and may be repeated several times when necessary. These cases generally respond well to roentgen ray therapy in conjunction with routine treatment.

Sinusitis. — Irradiation in some types of sinus infection has proved of defi-

nite therapeutic value. It is understood that sinusitis represents different stages of the same disease, or in other words one is sequel to another. Some cases represent a gradual conversion from the acute to the chronic stage and, therefore their response to treatment will differ.

For our purpose it must suffice to group this condition as classified above.

It is risky to employ roentgen ray therapy in acute sinusitis unless there is ample drainage. If an exposure is given while there is lack of drainage, tissue edema is apt to occur and emergency surgery may become necessary. Therefore, I do not advocate x-ray therapy in early acute sinus infection and advise that traditional treatment either in the form of sprays, drops or the displacement method should be employed. In many instances it becomes necessary to induce drainage by infraction of the turbinates, by puncture of the antra or by rasping of the frontal sinus. Irradiation would therefore be valueless in acute sinusitis of this type. Only when we find that there is ample drainage, with acute pain, localized headache and rise of temperature, will roentgenotherapy hasten recovery.

The technic as carried out by Dr. Louis Edeiken of the Department of Radiology at the Mt. Sinai Hospital is as follows: In acute cases of sinusitis with ample drainage, 105 r is given anteroposteriorly, to the right lateral and left lateral fields. The factors used are 132 kv. 5 ma. 35 cm. S.T.D. and 1/4 mm. cu. Each field is 10 cm. by 15 cm. One area is treated daily. The entire course of treatment is repeated at the end of a week.

The hypertrophic type of chronic sinusitis presents such symptoms as cough, impairment in respiration, which have been present from several months to several years. There is a history of recurrent rhinitis, and routine treatment including antral washings, give no relief to the patient. The hypertrophic type of sinusitis responds slowly to irradiation.

It would naturally follow that in chronic inflammation the dosage would be larger than that of an acute inflammation.*

Dr. J. G. Cohen, roentgenologist in Philadelphia, suggests that the exposure be directed to the three portals into the sinuses; one anteriorly and the other two laterally. Each individual dose totals 250 r. This is given with what is commonly referred to as deep therapy — 200 kv.; filtration 0.5 copper and 1 mm. aluminum; skin target distance 50 cm. Treatment is given three to four times weekly and is continued for six to eight weeks until the total of about 3000 r is given into the sinuses, the center of the field being calculated approximately on the level of the anterior wall of the sphenoids.

The hyperplastic type without polyp formation and which is not ascribed to hay fever or to allergic phenomena often responds to the type of irradiation given to the hypertrophic type. However, the results are not as frequent nor as gratifying. Hyperplastic sinusitis complicated by multiple polypi does not respond at all to irradiation.

I have found that where polypectomy and radical surgery have been performed, in about 75 per cent of the cases there will be no recurrence of polyp formation, when x-ray therapy is instituted within a few days after radical surgery.

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* In skin or superficial inflammation or infections, low kilovoltage is used with little or no filtration. In deeper inflammatory processes and infections moderate wave therapy is used — the kilovoltage being higher and some filtration also being employed. In malignant and deep hypertrophic lesions a higher kilovoltage and more filtration is indicated.

At Mt. Sinai Hospital Dr. Louis Edeiken, radiologist, suggests that 315 r be given to the anteroposterior field and 105 r be given each to the right and to the left fields, the treatment to be repeated at the end of a week. At Temple University Hospital, Dr. W. E. Chamberlain, roentgenologist, suggests 150 r twice weekly for twelve sessions. Regardless of the variation in the time element and dosage irradiation prevents the recurrence of nasal polypi.

In the atrophic type, x-ray therapy is distinctly contraindicated. Although at one time it was thought that small stimulating doses might be of value, today this is not accepted. We know that good clinical results in hypertrophic and hyperplastic sinusitis are due to the formation of mature fibroconnective tissue. In atrophic rhinitis, the predominant element is fibroconnective tissue and x-ray therapy will only aggravate rather than improve the atrophy.

X-ray therapy is contraindicated in all forms of nasal allergy. I have seen several cases of allergic vasomotor rhinitis which almost terminated fatally because x-ray therapy was employed. One case in particular developed meningeal symptoms with 2000 cells in the spinal fluid; in another case an emergency external frontal sinus operation had to be performed because of edema of the mucous membrane and impediment in drainage. Should such a reaction take place, it is advisable to give large doses of atropine, adrenalin, parathermone hypodermically and calcium gluconate intravenously. These drugs should be given rapidly and frequently with the hope that the tissues will respond and will quickly contract. In conjunction with this, it is advisable to posture the patient and instill into the sinuses neo-synephrin and ephedrine 1/2 per cent solution in normal saline solution.

We shall consider rhinorrhea because it is due to hypersecretion of the mucous glands without any known etiologic factor. The symptoms presented are very annoying cough, and prenasal and postnasal watery discharge. Atropine sulphate does not seem to control the symptoms. X-ray therapy of 100 r three times weekly given in twelve sessions often produces cessation of the secretions and disappearance of the associated symptoms. The following factors were used: 135 kv. 5 mas. 14″ S.T.D. 1/4 cu, 100 r.

Adenitis, particularly cervical adenitis responds rapidly and favorably to irradiation. In most instances resolution is the outcome after roentgen therapy. Occasionally coalescence of the glands takes place with pyogenic localization and the complex symptoms of the glandular fever terminate when the pus is evacuated. One hundred r given every other day, depending upon the reaction and the response, will aid in bringing about a satisfactory termination. The following factors are employed: 135 kv. 5 mas. 14″ S.T.D. 1/4 cu. 100 r.

Summary

1. Roentgen therapy is now recognized as a valuable therapeutic aid in the routine care and treatment of certain otorhinologic conditions.

2. In conjunction with conventional treatment selected cases of sinus infections, as well as aural infections, can be benefited by roentgen therapy.

3. Where routine care and treatment in sinusitis have failed, roentgen therapy may bring about a successful result.

4. Conductive deafness, due to lymphoid tissue about the eustachian orifice responds well to roentgen therapy.

5. Persistent suppuration of the middle ear after radical mastoidectomy sometimes does not respond well to routine measures, but roentgenotherapy by destroying the granulation tissue either facilitates epidermatization of the middle ear, or the formation of mature fibroconnective tissue, resulting in a "dry ear."

6. Roentgenotherapy is an aid in our armamentarium in treating selected cases of chronic suppurative otitis media and otorrhea after radical mastoidectomy.

7. Roentgenotherapy may be effective in many cases, but is not a panacea.

8. Cooperation between the otorhinologist and the roentgenologist is of the utmost importance if the best results are to be obtained.

1915 Spruce St.

References

1. Ersner, Matthew S., and Weiner, Louis H.: Roentgenotherapy in Otorrhea Following Radical Mastoidectomy, M. Rec. **140**:588 (Dec. 5) 1934.

Discussion

Dr. Raphael Schillinger (Brooklyn, N. Y.): In the main, the essayist finds that roentgen therapy is beneficial in acute infections and in conditions of lymphatic hypertrophy. His findings parallel the observations of numerous investigators, many of whom have emphasized that this therapy is most effective on inflammatory lesions characterized by leukocytic infiltration, lymph stasis and lymphatic hypertrophy. Truly representative of this histopathologic state is the lesion in acute suppurative otitis media, and its spread into the mastoid.

There is much evidence to the effect that the duration of suppuration in otitis media is shortened by x-rays, that the severity of the symptoms is markedly ameliorated, and finally that early prophylactic and therapeutic application of the x-ray has definitely diminished the incidence of surgical mastoiditis. Specific contraindications to irradiation in mastoiditis have already been established and serve to avoid employment of this form of therapy as a panacea.

It is therefore surprising that the essayist reports an inability to find beneficial and curative effects from x-ray therapy in acute suppurative otitis media. In view of the glowing recommendations that have appeared in reports from various parts of the country, and in the face of numerous experiences with such therapy in my own practice, I must object to the condemnation offered by the essayist. I am convinced that next to indicated surgical procedures, x-irradiation is a prime therapeutic measure and the most important one at the disposal of the otologist in the management of acute mastoiditis. Small doses with low voltage, in my experience, are more effective than large doses with high voltage.

Regarding conductive deafness, it is conceivable that x-ray therapy is effective in early and acute stages. However, I have seen but little improvement in chronic cases. This suggests that the lesion contains a mature fibrous connective tissue which is little or not at all sensitive to x-rays.

In chronic suppuration of the middle ear, experience has taught me that x-ray therapy is usually effective within a short time or not at all. Some of these cases have a small cholesteatoma in the middle ear and antrum which defies x-rays as effectively as it does all other measures except surgical intervention. In postoperative otorrhoea, x-ray therapy has certainly proved valuable. Fortunately the occurrence of this condition is on the decline.

The term "sinusitis" has been used loosely to cover a large variety of lesions in the upper respiratory tract. In the absence of a clearly defined classification of sinus lesions, there is apt to be indiscriminate evaluation of therapeutic measures and agents. I can therefore appreciate the essayist's orderly evaluation of x-ray therapy for distinct types of this disease.

In general I have not seen any harm from x-irradiation of the sinuses either in the acute or chronic states. Neither have I observed the remarkably good results as those which follow irradiation of the suppurating ear. A likely explanation for the difference in reaction is that the sinus mucosa is not as well vascularized and is not subject to the same degree of leukocytic infiltration as is the mucosa of the middle ear and mastoid antrum.

Despite several favorable reports on x-ray therapy in sinusitis, its use has not been scrutinized as critically as in ear conditions and still requires specific indications and contraindications. It seems that diagnostic methods are not utilized as fully as they should be for the differentiation between anatomic and functional lesions in the sinuses. I believe that each case should be examined radiographically with the aid of lipiodol, to determine the functional status of the sinus mucosa and to obtain more accurate data regarding membrane thickenings and ostial patency. Thus concise recordings of the sinus state at the beginning of treatment can be con-

trolled with similar checks at the end of treatment, and offer more reliable evaluation of the effects of treatment than do subjective symptoms alone. Furthermore, indications for x-ray therapy and for surgical therapy can be more critically determined when lesions are typed according to the functional capability of the sinus mucosa. Obviously a membrane that is functioning normally does not require the same treatment as one that is incapable of function. Infiltrated membranes respond to treatment differently than degenerated membranes. This entire field requires much more study. In nasal allergy I do not advocate x-ray therapy as routine treatment. I cannot agree that it is contraindicated in all cases because I have observed several patients with allergic rhinitis who were relieved by x-ray therapy after all other forms of treatment had failed.

Dr. G. Allen Robinson (New York): I have enjoyed Dr. Ersner's excellent paper and am glad that he stresses the importance of cooperation between the radiologist and otolaryngologist. He has shown that many stubborn and often obscure conditions have yielded to radiation alone, or in combination with other methods of treatment. Careful and accurate observations are necessary in the treatment of these lesions, otherwise erroneous conclusions may be reached. In fact more harm than good may result if rational radiation therapy is not employed.

Dr. Ersner did not include radium therapy in the scope of his paper, but I am sure he feels that both roentgen rays and radium are valuable adjuncts in otolaryngology. In the treatment of malignant lesions of the head and neck roentgen rays are used externally to the limit of skin tolerance while additional radiation is administered interstitially by radium therapy. The use of platinum radium needles and gold radon implants in the primary lesion and metastatic nodes gives the additional dosage necessary to bring about lethal destruction of the resistant cancer.

In the treatment of malignant tumors of the nasal sinuses surgery, roentgen ray and radium are employed. Surgical measures permit drainage and enable the operator accurately to place the radium tubes in the nasal sinuses. Encouraging results are also obtained in the treatment of carcinoma of the middle ear by preoperative and postoperative radiation. Radium therapy is effective in the treatment of polypoid ethmoiditis causing growth restraint and producing fibrous tissue in the involved area. The reduction of lymphoid tissue in the nasopharynx may be accomplished by intraoral roentgen therapy using a cone 2.5 to 3 centimeters in diameter, or by applying standard radium tubes directly to the nasopharynx through the nasal cavities. I was especially interested in the results obtained in the many inflammatory conditions of the ear. The technic of roentgen therapy as used by Drs. Chamberlain, Cohen, Edeiken and Young has been given and will serve as a guide to be used by others.

Dr. Ersner has not attempted a review of the literature, but has given us his own observations and experiences with roentgen rays in the field of otorhinology. We shall look forward to his subsequent studies in which a more detailed analyses of the cases treated will be given.

Dr. Maurice Lenz (New York): Dr. Ersner has presented an unbiased and comprehensive review of the clinical indications and contraindications of x-ray therapy in benign otorhinologic conditions. Our experience in the Departments of Radiotherapy at the Presbyterian Hospital and Montefiore Hospital of New York, in general, corroborates his views, even though we may disagree somewhat on questions of the technic of irradiation. We have recently reviewed our own material and I would like to quote our results in external otitis as summarized by Dr. Hinkle of the Presbyterian Hospital.

Since 1930, 66 females and 23 males have been treated with x-rays for external otitis, of these 70 were adequately followed up and permit evaluation of the treatment. About half were classed as acute and the others as chronic. The acute types either had a furuncle or a recent inflammatory edema without suppuration. The pain subsided in 6 to 24 hours and the swelling disappeared in a few days up to 2 or 3 weeks later. Frequently there was an acute exacerbation of pain in the irradiated region three to four hours after treatment. This was followed by subsidence of the entire process shortly after. The chronic types usually presented a scaly or weeping dermatitis in and around the external ear that had lasted from a few months to twenty years, in spite of all forms of treatment. This dermatitis disappeared promptly after x-ray treatment. Comparing the treated and untreated ear we had the impression that there was a definite benefit from irradiation. To illustrate, we had a patient with chronic itching, scaling and weeping dermatitis in and around the ear following a purulent otitis media, of twenty years' duration in spite of all kinds of treatment which cleared up in one month after x-ray therapy.

We did have some experience with vasomotor disturbances and our experience was more like that of Dr. Ersner's than that of Dr. Schillinger's. We did not see any definite improvement.

In conclusion, all I can say is that Dr. Ersner's paper shows the importance of clinical evaluation of a treatment. It is neither the narrow view of a surgeon nor the narrow view of a radiologist; it is the view of an experienced, unbiased clinician, and I congratulate him upon this very excellent presentation.

In cases with marked lymphatic hyperplasia in the nasopharynx, especially around the eustachian tube, x-ray therapy reduced this hyperplasia, improved the complicating deafness in a number of instances and there was marked reduction in the frequency of head colds in these patients.

Dr. Matthew S. Ersner (closing): I had hoped that there would be more disagreement than there has been. By the time patients with acute suppurative otitis media come to the office or otorhinologists first see them, many have passed into the stage where a great deal of bone destruction has taken place. I do not know whether this is due to the fact that we do not get these patients early enough to obtain the results Dr. Schillinger has mentioned; however, we did not get the results which so many have claimed and therefore we did not recommend this therapy. Of course, this is my experience, and it is as unbiased as I can possibly give it.

In regard to deafness, I think we should be extremely cautious. The various firms who sell instruments for the hard of hearing advertise in the press, and anything that we may say about deafness is apt to be misinterpreted. We feel that certain types of deafness in their inception are amenable to treatment especially when they are due to the lymphoid tissue about the eustachian tubes. When there is destruction in the middle ear or retraction of the ear drum, little can be accomplished. For example, several days ago we had a patient to whom we not only suggested x-ray treatment but in conjunction with it, some endocrine treatment.

In so far as chronic suppurative otitis media is concerned, I did not go into detail. I might say that the non-dangerous type of suppurative otitis media (which by the way might become dangerous at any time), where there is no bony necrosis, in many instances, can be determined through x-ray study.

I appreciate Dr. Schillinger's classification of sinusitis and the state of the sinuses. I am also aware that I did not classify the various types of sinusitis. It is true, that we make our diagnosis not only from the condition of the sinuses, but from the type of tissue with which we are confronted, also from the viability, the cellular motility and the function of the sinus, before we attempt any treatment. This alone, however, is a subject which would take more time for discussion than is at my disposal. Indications and contraindications for the treatment with benzedrine and sniffers of benzedrine, of which there are so many, can be discussed at great length. But, assuming that we have carefully studied the sinuses, we know that there are many changes constantly taking place in the tissues. In hypertrophic and hyperplastic tissues it is our aim to retard the hyperactive tissues and glands and eventually promote the formation of fibroconnective tissue. Roentgenotherapy often accomplishes this feat.

On nasal allergy, I went "overboard," as it were, but I feel that some of the disasters we have encountered merit earnest consideration. To illustrate, I was consulted in the case of the son of a prominent roentgenologist in the city. He gave him 75 r over the frontal sinuses and within a few hours meningeal symptoms developed due to edema of the mucous membrane of the frontal sinuses with impairment in drainage. It took a great deal of care and observation and perhaps forty-eight hours of anxiety on my part until the edema subsided. Therefore, I should like to stress the importance of avoiding irradiation in allergy, because after all, allergy is not a local condition. In allergy we are only scratching the surface, and I hope that some day we will get down to basic physical factors that may explain allergy. X-ray alone, I am convinced, will not do it.

In answer to Dr. Robinson, I would like to stress that we are all aware that x-ray and radium are the agents we employ for malignancy. I purposely did not discuss malignancy because my subject was on benign otorhinologic conditions and I felt that this was not the opportune time to bring it up. I would like to see roentgenotherapy employed more routinely, just as cocaine and ephedrine and neosynephrine, and the like are employed in selected benign conditions. Dr. Lenz, in writing to me, gave me an idea about these conditions. We know that in grave malignancy, we would try almost anything. In certain cases we use certain drugs. Ionization, short wave therapy, and now the x-ray has been added to our armamentarium because we have found that certain otorhinologic conditions respond favorably to this type of therapy.

THERAPEUTIC ADVANCES IN VASOMOTOR RHINITIS AND BRONCHIAL ASTHMA *

J. A. HAIMAN, M.D.

NEW YORK

In previous papers I have gone to great length to show the cause of diseases of the so-called sensitive groups, namely; vasomotor rhinitis, bronchial asthma, nasal polyps, and the like. In this presentation, I shall only make brief mention of what I believe to be the basic and underlying cause for sensitivity. I have long felt that the basic etiologic factors were due to imbalance of the autonomic nervous system caused by great emotional upsets, economic or domestic in character in patients who have an hereditary sensitivity. Recently, this has been confirmed by such outstanding authorities as Felix Deutsch of Harvard, Foster Kennedy of New York, and Alvarez of the Mayo Clinic. Be that as it may, what we are mostly interested in is the treatment of the resulting factors, whatever the producing cause might have been.

Much has been written about ionization of the nose for vasomotor rhinitis. This form of treatment has been practiced for twenty years. I first heard it presented at the Academy of Medicine in 1921, by Dr. McCoy, who had first seen it employed in the English army for the treatment of chronic discharging ears. He was quite enthusiastic in his report, having treated a number of cases of this kind which had cleared up under the zinc ionization method that I shall briefly discuss. Since those days, ionization has been applied also to the nasal mucous membrane in vasomotor rhinitis and hay fever.

The procedure employed in the nose is a relatively simple one and no elaborate equipment is required. Many expensive apparatus have been placed on the market that have not offered any further advantage than the old standardized wall plate, which actually answers every purpose. The results obtained by this procedure have been most satisfactory when it was combined with other essential features, such as the production of changes in the blood chemistry, a proper dietetic regimen, and the correction of endocrine imbalance. Herein lies the cause of so many failures in the treatment of these conditions by ionization alone.

I use an assayed zinc electrode which has been shaped for nasal treatment. In markedly hypertrophied, water-logged inferior turbinates, the positive pole is placed within the nasal fossa and the negative pole either wrapped around the wrist or held in the hand. In the ear, one must be careful not to increase the dosage too quickly as it will cause a marked upset, such as dizziness, nausea, vomiting and nystagmus. Particularly where there is a fistula in the horizontal semi-circular canal, these symptoms may be so marked that the patient will be unable to stand without falling. It is far better to introduce a smaller amount of current to the ear in the first treatment (about 2 ma.) to ascertain how much the patient is able to take without unduly upsetting him.

Electrocoagulation

Much has also been written about electrocoagulation of the hypertrophied inferior and middle turbinates of the nose. This procedure is done by first cocainizing the anterior portion of the turbinates. Then the biterminal

* Read at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 7, 1939.

nasal electrode is introduced in the turbinate and carried back all the way to the posterior tip. In this way very little of the nasal mucosa is injured. This method in competent hands is far more satisfactory for the reduction of the size of the turbinates than removing the hypertrophied portions by scissors and snare. There are no scars resulting from this procedure. In nasal polyps both prongs of the biterminal electrode are introduced directly to the nasal polyps, which can be greatly reduced in size by three or four well-directed applications. It usually takes from six to ten applications for their complete removal.

There is a vast literature on the electrocoagulation of tonsils, and by many it has been relegated as inapplicable, except in tabs and small tonsillar returns. However, I do not agree with this attitude and feel that there is a definite place for the removal of tonsils by this method in individuals who are prone to surgical shock and possible hemorrhage. This procedure is particularly beneficial in patients suffering from bronchial asthma, diabetes, thyroid disease, and other affections in which anesthesia and surgical shock are distinctly a menace. It should be stressed that one must be adept in the carrying out of this procedure.

It also should be borne in mind that the heat during the coagulation will cause thickening of the anterior and posterior pillars of the tonsils, and this might cause the examiner to assume the presence of tonsillar or lymphoid tissue. It usually takes eight or ten applications to thoroughly eradicate all tonsil or lymphoid tissue.

In sinus headaches and in asthma, I employ short wave instead of conventional diathermy. Through the head the maximum heat should be between 4500 and 5000 ma. Many patients will complain of the intense heat, when this upper figure is reached through the chest. However, 5000 to 5500 ma. may be used from 5 to 15 minutes with markedly beneficial effect in cases of bronchial asthma and other chest conditions.

Ultraviolet and Infra-red

Ultraviolet radiation has a very beneficial effect upon the nasal and pharyngeal mucosa. The average maximum exposure is a minute and a half. Longer exposures will produce marked burning of the sensitive nasal and pharyngeal membranes. It is also highly important to keep the generator checked up every three to six months to be sure that one is getting adequate ultraviolet dosage.

Infra-red irradiation is a great aid where one is suffering from an intense sinus headache. In fact, I know of no other method that will as readily relieve an acute sinus headache. An exposure from three to fifteen minutes may be given without any harmful effects to the eyes or skin.

Diet plays an important role in these cases. The withdrawal of carbohydrates, sweets, fats and condiments is very essential. Milk and eggs are also prohibited.

Topical medication is used to give immediate relief for nasal congestion. The most popular drug today is a neosynephrine (1 per cent) solution combined with a weak solution of cocain.

It is important to administer calcium intravenously. Most of these cases suffer also from anxious emotional instability for which I give a belladonna preparation at bedtime.

Hormonal products are employed for endocrine imbalance. In many cases of hypothyroidism, marked improvement is seen in the nasal mucosa when the thyroid deficiency is corrected.

Emotional imbalance plays an important role in these sensitive conditions. Its correction is essential before a return of normal health can be obtained. On the other hand, local treatments alone will not clear up these

sensitive cases. If a careful study and correction of the dietetic regimen is made, endocrine imbalance corrected, blood chemistry abnormalities adjusted, and emotional disturbances removed, then and then only will the results be gratifying.

1125 Park Avenue.

Discussion

Dr. A. R. Hollender (Miami Beach, Fla.): The essayist's paper is of considerable interest. It leaves the impression that the allergy problem is not difficult of solution. With this I take exception. I still encounter obstacles in giving my allergic patients relief, and certainly I am not so sure that the number I actually cure is very large.

We must not lose sight of the progress which allergy has made. It is true the diagnostic phase has been more successful than the therapeutic, especially so far as specific immunization is concerned. Immunization therapy is not as beneficial as allergists would have us believe. If it were, the rhinologist would not be annoyed by patients who have tried injection treatment. Due to the large percentage of failures, resort must be had to non-specific procedures.

Of these, iontophoresis is my choice, not because it is the ideal, but because it gives the best results with the least hazard and a minimum of inconvenience to the patient. It is not a cure in the average case, although it could be considered as such in many instances. I have always held that ionization is a prolonged palliative and this has been repeatedly proved in large series of cases.

From the standpoint of what physical therapy has contributed to the solution of the allergy problem, I am of the opinion that we had better not claim too much. We do have some additional means to combat the problem and occasionally they prove successful, but in a general way the allergy problem has not been benefited to any great extent from physical medicine.

Dr. George Major (Reading, Penn.): I am one of the ordinary general practitioners who has a psychiatric point of view. It always has seemed to me that the specialist has forgotten one of the dicta. If you read the rules laid down for the practice of medicine, you will remember that they say very distinctly that it is not the disease so much that the patient has, but what patient has the disease. Unfortunately, we forget to look at the patient, his economic status and all the other factors that go to make him up. A busy nose-and-throat man is so busy snatching out tonsils and spraying and gargling that he has forgotten to look at the type of patient he has to treat.

I call attention to a book recently written by a dentist. His name is Price and he has written a book called, "Diet, Nutrition and Physical Degeneration." He has made a study of all the primitive peoples throughout the world. His statistical studies are so impressive and his entire book so revealing that we as medical men should read this contribution.

He shows that where life is primitive and close to the soil, and where the dietaries which have been learned by generations and handed down, are so much better than what we practice and use, that we have a great deal to learn from primitive tribes. We in our civilization are relearning again a thing that has been known for generations. We, the almighty, the very important civilized people, should bow down and look again at the primitive peoples. Furthermore, I would like to refer to Edmund Jacobson's book entitled "You Must Relax." We are too important people today. We live too rapidly. We have forgotten how to eat and how to relax.

I say that with a certain degree of humility because the average practitioner is so busy with mechanistic things that he forgets to become philosophic. Medicine is still an art.

Dr. Lewis J. Silvers (New York): I believe that the essayist deserves considerable commendation for presenting a subject that is still so enigmatic, so troublesome in the field of nose and throat practice, that few have really honestly had the courage to tell a patient that they can cure him or her on first observation. I feel that we are dealing with a problem which the average rhinologist loves to sidetrack, to refer to his assistant, to have the blame cast upon the fellow who will take the blame while he himself still enjoys his reputation.

The hardest task that we face is the case of vasomotor rhinitis, and I believe that Dr. Haiman is making some progress. I think Dr. Major's psychiatric approach has also made progress. Nobody at the present time knows what the exact etiology of this affection is, and I know it will be just a matter of another year or two when we correlate what we all have found to be of value in conquering this malady.

I have cured several hundred cases of vasomotor rhinitis. How I have done it, I don't know as yet because all the varied cases have been treated in various ways. But I feel that our large practice in this particular field is non-operative otorhinolaryngology.

Operative interference of the orthodox type is of little avail in allergic or hyperesthetic rhinitis and the allied conditions which accompany this syndrome. Electrocoagulation of obstructing polyps; subcoagulation and permanent fibrosis of hypertrophied turbinals or conchae, while affording increased ventilation render the nasal mucosa less sensitive to external ir-

(*Continued on page 494*)

DETACHMENT OF THE RETINA *

End Results of Electrosurgical Treatment

HUGH S. McKEOWN, M.D.

NEW YORK

The end results of surgical treatment for detachment of the retina have been analyzed in 500 unselected cases operated at the Institute of Ophthalmology of Presbyterian Hospital. The series includes cases reported by the author in 1932, others reported by Drs. Dunnington and Macnie in 1934 and 1937, and 120 additional cases operated since January 1, 1937. In view of our belief that all eye affections for which there is no possibility of a spontaneous cure should be given a chance by surgery, many so-called "hopeless" cases were operated and are included in this series. The results were often disappointing, but surprising recoveries occurred with sufficient frequency to encourage our interest in these unfavorable cases.

The ages of the patients in this series ranged from 6 to 79, the majority being between 30 and 40. Sixty-six per cent were males and 34 per cent females. In unilateral cases there was no evidence of preference for either eye, the right eye alone being affected 208 times, the left eye alone, 214 times. Bilateral detachment occurred in 84 individuals.

Trauma. — The positive history of trauma was obtained in 66 or 13 per cent of the cases, and was higher among the males (21%) than among the females (9%). Cases were considered to be due to trauma when a definite relationship between the injury and the onset of detachment could be determined.

Refractive Error. — A review of the literature revealed that some degree of myopia exists in over 50 per cent of all cases of retinal detachment. In this series it occurred in 61.5 per cent and amounted to 6 diopters or over in 35 per cent. Several aphakic patients with retinal detachment were found to be highly myopic.

In a great many patients designated as cured it has been observed that the refraction of the eye has altered materially, a fact suggesting that a change has occurred in the distance between the anterior and posterior poles of the eye. A case with 7 diopters of myopia was reduced to 2.5 diopters, another with 3 diopters of myopia became emetropic, and one with emetropia required a +3.00 diopter lens to read 20/20.

Muscle Tenotomy. — Routinely the rectus muscles were tenotomized and reattached at the completion of the operation. No annoying postoperative diplopia resulted from this procedure and our preoperative and postoperative muscle tests have shown that muscular balance was not impaired.

Intraocular Tension. Lowered intraocular tension, or hypotony, is a grave prognostic sign. In this series there were 33 cases treated surgically in which the preoperative intraocular tension was below 10 mm. of mercury (Schiotz). The retina was reattached in 3 cases but functional vision was not restored. Hypotony is usually associated with extensive hemorrhage or extensive detachment, or both, and is not infrequently found in a patient with detachment who appears to be a good operative risk in all other respects. The conclusion is that preoperative intraocular tension should be recorded in every case of retinal detachment.

* From the Institute of Ophthalmology, Presbyterian Hospital, and the Department of Ophthalmology, College of Physicians and Surgeons, Columbia University.

* Read at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 7, 1939.

In one instance there was a rise in intraocular tension which terminated in chronic glaucoma. The patient had a hyperopia of 6 diopters in the right and a myopia of 11 diopters in the left eye. Retinal detachment occurred in the myopic eye and was reattached surgically and normal vision was restored. The glaucoma was discovered six months after the operation. Trephining did not relieve the increased tension.

End Results

The end results of surgical treatment of retinal detachment have been classified as cured, improved, and unimproved. The eyes were considered "cured" when the retina was completely reattached, the visual field enlarged, and functional vision obtained and maintained. The "improved" eyes were those in which the retina appeared to be in normal position and the visual field enlarged, but in which functional vision was not obtained.

In the entire series of 506 cases the detachment was either cured or improved in 54.5 per cent (cured in 45.2% and improved in 9.3%), and unimproved in 45.5 per cent. Forty patients were operated two or more times. In one instance complete reattachment was secured only after the fourth operation. Several cures were obtained with second operations, but the statistics on the whole warn the surgeon to give a guarded prognosis when advising a second or third operation.

Effect of Duration and Extent of Detachment. — There is general agreement that the end results of surgical treatment depend upon the duration of the detachment prior to operation and upon its site, extent, and type. When the exact date of the occurrence of the detachment is unknown, an approximate date can usually be determined. In the group of cases operated on within one month after onset, 66 per cent were cured. Of those operated on within three months, 50 per cent of the cases in which not over one-half of the retina was detached were cured.

In the group with more extensive detachment (three-fourths or more of the retina) a favorable result was obtained in 20 per cent when operated on within one to three months after onset. Of 10 cases in which the detached retina had existed for at least a year, 5 were cured. The longest interval between onset of detachment and successful operative result was four years.

Bullous and Flat Detachments. — Bullous detachment was noted in over 80 and flat detachment in less than 20 per cent. Of those patients with a bullous detachment involving not more than one-half the retina, approximately 65 per cent were benefited by operation. Of those in whom one-fourth or two-fifths of the retina was very slightly elevated, i.e., flatly detached, a cure was obtained in 75 per cent.

Holes. — The entire area of the detachment was treated surgically in an effort to create an adhesive choroiditis, which we feel insures a more permanent result. Retinal holes were looked for in all cases and when found an attempt was made to seal them by concentrating the treatment over the areas in which they occurred. Many cases in which no holes had been located preoperatively were benefited by operation, but results were better when one or more of them were found. Among patients in whom a single small hole was seen preoperatively a satisfactory result was obtained in 60 per cent.

Failures. — The failures were probably due in many instances to general or specific pathologic conditions existing prior to operation. Of these the two most common causes were (1) the presence of high (degenerative) myopia, and (2) the magnitude of the detachment. In other cases there were noted atrophic changes in the retina and choroid, hemorrhages in the vitreous and retina, inflammatory retinitis and choroiditis, arteriosclerosis and vascular hypertension, intraocular foreign body, and in one case, retinitis proliferans. In some cases no cause for failure could be ascertained.

Failure to obtain normal central vision after the retina has been reattached by surgical treatment has created much discussion. Reese explains that there is a tendency for a detached retina to undergo cystic degeneration, especially in the macular region. After studying a series of cases both clinically and microscopically he concluded as follows: "(1) A cystic degeneration of the macula accounts for the poor central vision after the reattachment of a detached retina that involved the macular region. (2) The defective central vision so frequently found following successful operations for detachments of the retina suggests that a macular detachment with cyst formation was present even though it might not have been recognized clinically."

Summary

In 506 cases of retinal detachment, 66 per cent were males, 34 per cent females; the majority were between 30 and 40 years of age.

A positive history of trauma was obtained in 66 cases or 13 per cent, twice as often in males as in females.

Myopia was present in 61.5 per cent.

Tenotomy of the recti muscles did not produce annoying diplopia or muscular imbalance.

Intraocular tension was permanently affected in only one case.

Detachment was cured or improved by operation in 54.5 and unimproved in 45.5 per cent.

Of all cases operated within one month of onset, 66 per cent were cured; of those operated within three months in which not over half the retina was detached, 50 per cent were cured; of cases operated within 1 or 3 months in which three-fourths or more of the retina was detached, 20 per cent were cured.

Bullous detachment occurred in 80 per cent of cases of whom 65 per cent responded favorably to surgery; flat detachment occurred in 20 per cent of cases of whom three-fourths responded favorably.

Surgical results were better when retinal holes were found.

Preexisting degeneration of the retina in the macular region accounts for some of the failures of reattachment.

Cystic degeneration of the retina in the macular region accounts for poor central vision after the reattachment of a detached retina involving that region.

Bibliography

1. McKeown, Hugh S.: Detachment of the Retina: The Guist Operation, Tr. Am. Acad. Ophth. **37**:240, 1932.

2. ————: Detachment of the Retina: The Guist Operation and Report of Cases, Arch. Ophth. **9**:64 (Jan.) 1933.

3. Dunnington, John H., and Macnie, John P.: Detachment of the Retina, Tr. Am. Acad. Ophth. 1934, p. 133.

4. ————: Detachment of the Retina: Operative Results in 164 Cases, Arch. Ophth. **18**:532 (Oct.) 1937.

5. Reese, Algernon B.: Defective Central Vision Following Successful Operations for Detachment of the Retina, Am. J. Ophth. **20**:591 (June) 1937.

Discussion

Dr. Luther C. Peter (Philadelphia): As Dr. Posner has clearly stated, during the last few years the generally accepted method of treating retinal separation is by diathermy combined with individual operators preferences for surface coagulation and catalysis. The general trend is toward simplified technic, namely, fewer needle punctures, and more minute surface coagulations supplemented by the less damaging punctures of the negative galvanic needle.

It is my belief that the greatest progress has been made in limiting diathermy puncture (1) to surrounding of tears and disinsertions, (2) to establish adequate drainage, and (3) to the use of short needles. Surface coagulations, while probably increased in number, are safely reduced in size and finally the entire surface is advantageously treated by cathode needles of about one millimeter perforation, while holes in the macula are treated by the latter agent. This method of approach,

which was gradually evolved in my own hands as well as in the experience of others, has led to a greater number of cures, less trauma to the tissues, and, to all intents and purposes, slight, if any, danger to the retinal blood vessels. Hemorrhages are exceedingly rare.

The technic of each operator may vary slightly, but in the main the general trend is toward simplification. The technic, however, calls for most careful study of each patient and an accurate plotting of the requirements before he is admitted to the operating room. There are differences of opinion as to the need for detachment of muscles. My own preference is for an unrestricted field, to be able to reach all parts of the separated area. Muscles can be cut and re-attached so accurately that no motor disturbance will follow. And, after all, precision in each step of the operation is the best guarantee that a second operation, with all its difficulties, will not be required.

So far as end results are concerned in my experience, the location of the tear, the extent of the separation, the duration of the separation and the etiology are the important factors which influence the results of well performed surgery. They are generally accepted as important in arriving at a prognosis. Little has been said on the type of surgery which might be indicated in each case. In view of the wide differences which appear in the literature, as to the percentage of recoveries which are obtained, is it not likely that surgery, per se, should be regarded as vital, in summarizing the difficulties which interfere with maximum results, even in cases which seem to be particularly hopeful, but which, nevertheless, fail. I believe this to be a fact. Surgery for retinal separation will yield maximum results only after much experience and practice. The casual operator may have fair success, but with added experience his results will improve. This was my experience and probably that of every ophthalmologist who has performed the operation many times. Since 1932, when diathermy and catalysis came into use, most of us began to operate without sufficient experience to avoid the pitfalls, and surely without a comprehensive understanding of individual needs. As opportunities to operate multiplied, cures became more frequent. It is my belief that in the future cures can be expected in a much larger percentage of cases than is now obtained if thorough preoperative studies are made and if the operative procedures and individual indications for the proper type of operation become crystallized.

After seven years of practice of the modern technic, men of large experience should be able to offer a higher percentage of satisfactory results in order to counteract the general tendency of many in our speciality to delay the time for operating. This delay may be due to skepticism as to what can be done in retinal separation, influenced in their decisions by the results of the older methods, or to a lack of knowledge of what really is being accomplished by selective types of modern methods. Delay leads to macular disturbance and to extensive separations, both of which have a tremendous bearing upon the ultimate results of surgery. As stated by one of the essayists, there are few cases which should not be given the benefit of operation even though the outlook may be doubtful. With a more awakened profession, such advanced cases will become fewer in number, and these patients will be brought to the surgeon at a time when their chances are better. There will be fewer cases put to bed for four to eight weeks in order to see whether non-surgical treatment may avail.

I would urge upon all surgeons who have the opportunity of operating upon a large number of cases, to continue their research work in technic so as to raise their own standards and thereby increase the number of their satisfactory results. An eye subjected to retinal separation may show some pathologic process even after a successful operation. There may be some residual macular degeneration and some reduction in the visual fields. If, however, the operation is timed properly, and tissue trauma is reduced to a minimum, useful function can be restored, or should be restored, in a great majority of cases. Will it be too hopeful to expect an ultimate percentage of recoveries in 80 to 85 per cent of our patients? I believe not. Prompt, more selective and refined operative technic, in all probability, will fill in the gap between these figures and those which are now recorded in the literature.

Dr. Greenfield (El Paso, Texas): I would like to know the number of retinal detachments that they have a year at Presbyterian.

Dr. Harvey E. Thorpe (Pittsburgh): Dr. Posner has given us a careful analysis of the historical development of the modern treatment of retinal detachment. He has added a description of this technic with the Schoenberg double hook for oblique diathermic perforation of the sclera. This method walls off the retinal tear, causes plastic choroidal adhesions, and drains off subretinal fluid. One must, however, be careful not to perforate into subretinal space too early in the course of the barrage. In passing one should mention the method of Sourdille of Nantes (injection of mercury cyanide solution) at the sites of incisional or minute galvanocautery punctures to cause additional chemical reaction and better choroidal retinal adhesions. The undermining method of Lindner with injection of potassium hydroxide solution, used especially for detachment with macular hole, should be noted.

The essayist mentions among the causes of failure faulty localization of the tear and non-appreciation of the importance of finding it. At the risk of repeating what has often been said before, I wish to stress as a sine qua non the following factors for cure of retinal detachment: 1. careful search for retinal holes, and 2. their accu-

rate localization and the complete walling off of the region about the tear. In locating tears one is aided by the patient's history, first, as to the field of onset of light flashes, and second, the quadrant of earliest impairment of vision. This may appear as a cloud or a positive scotoma. Repeated ophthalmoscopic examination by direct and indirect method with a maximally dilated pupil and the patient's head in various positions may show up a hole behind a retinal fold. Peripheral tears are often difficult to discover. They are rarely seen clearly. I have found the ordinary corneal contact glass of considerable help in finding and studying tears in the neighborhood of the ora serrata. The contact glass does away with some of the peripheral corneal distortion. Stine's method of plotting the tear onto the scleral surface is extremely valuable and quite accurate. I also favor the method of ophthalmoscopic control during operation. If the exact position of the tear is not known, it may not be included in the barrage area.

Surgical diathermy has generally been preferred for the cure of retinal detachment. A blended cutting and coagulating current affords easy penetration and sufficient coagulation to cause plastic exudation. I use a small ball for surface application by Larson's method in two arcs over the region of detachment with the ora as a base, and thus include the retinal tear (plotted on the sclera with Gentian violet). This is followed by the insertion of individual micropins with a blended current, according to Safar's and Walker's methods, to create further points of adhesion and serve as drainage for subretinal fluid. This procedure avoids loss of subretinal fluid until all the pins are placed, i.e. until the last puncture is completed. It protects against accidental creation of new holes by the diathermic needle.

Dr. McKeown's presentation of the end results in 506 operated cases at the Eye Institute is especially instructive in that 5 out of 10 cases, one year old or more were cured. It is well that he stressed the avoidance of a rosy prognosis when cases require a second or third operation. I am inclined to agree with him that severance of a rectus gives better exposure than pulling the muscle belly aside with a ligature. Reattachment of the muscle only rarely results in diplopia, which is transient and disappears after two or three orthoptic exercises. Shrinkage of the sclera has been observed by me when weaker currents were used in the presence of a wet field.

Postoperative care should be strict. The patient should be in such position that the replaced retina is dependent and has the weight of vitreous on it. After four weeks of occlusion of both eyes, Lindner hole spectacles are given to the patient and should be worn for two months. This restricts activity and results in a higher percentage of recoveries.

Occasionally patients, especially aphakics, report light flashes long after operation. One such case of mine, an aphakic, previously myopic, after retinal replacement complained bitterly of light flashes. On examination, this was discovered to be due to a vitreous band waving back and forth from its attachment at the macula.

Detachment of the retina is in most cases progressive. Therefore, as soon as the diagnosis is made, Lindner spectacles must be used and the patient should be hospitalized. Much time is often wasted while patinets are undergoing complete investigations running from laboratory to specialists in an attempt to obtain etiologic factors. It is most important to immobilize the globe during the preoperative period while careful studies are made. The speakers today have pointed out, and it bears repeating, that the cases which come to operation early have the best chance for recovery.

Dr. Hugh S. McKeown (closing): I wish to thank the doctors who discussed my paper. Dr. Peter and others emphasized the importance of preoperative study for each case of detachment of the retina. With this I agree. I also feel that liberation of sufficient fluid to allow the retina to resume its natural position is another important factor in the surgical treatment of detached retina.

The doctor from El Paso asked how many cases are operated at the Presbyterian Hospital each year. I would estimate the number to be between eighty and a hundred. This report includes all private cases operated by our surgical staff as well as our clinic cases.

Vasomotor Rhinitis and Asthma — Haiman

(*Continued from page 488*)

ritating stimuli. The highly sensitive columnar epithelium of the nose is converted by subcoagulation or iontophoresis in measured dosage into the less sensitive squamous type of epithelium. This affords relief to the vasomotor types of varied etiology. Desensitization to allergins either from emanations or food is as important as the elimination of the unhygenic mode of living so ably stressed by the essayist. Only by attacking this difficult problem from every angle indicated can we attain complete success in its permanent eradication.

Dr. J. A. Haiman (closing): Dr. Hollender spoke of allergy. The main thought I would like to leave is to consider the autonomic phase of the individual, and by that I mean the investigation of the patient's nervous system as well as a general physical check-up. One of the discussers spoke of a psychiatric approach. I attempt to make a definite study of each individual in order readily to understand what is and what is not the basic factor causing the trouble, and this includes social and economic problems, any phobia of disease and exaggerated impressions of nervous symptoms. I could enumerate a large number of apparently organic disturbances, especially combinations of polyps of the nose and asthma, which were not benefited by all sorts of treatments, including even surgical intervention, until some psychic upset was discovered and remedied. It is precisely individual psychiatric study which has proved of great value in addition to the routine measures of a physical nature.

As far as Dr. Silvers remarks are concerned, there is no question that in the not distant time our work will be correlated. Both the profession and the laity seem to regard rhinologists as mechanized specialists who operate on each and every case for whatever derangement one may have in the concerned organs. This fallacious view will be altered in our favor when it will be realized that "nose and throat men," as they are often referred to in a none too respectful manner, are physicians who have the knowledge and ability to recognize underlying neurologic factors, which in turn implies that most problems in allergy will be clarified and solved in a satisfactory manner.

Esophageal Dysfunction — Mandelbaum

(*Continued from page 476*)

5. Abel, A. L.: Esophageal Obstruction. Its Pathology, Diagnosis and Treatment, New York, Oxford University Press, 1929.

6. Thurzo, E.v.: Quoted by Grandauer, See Ref. 13.

7. Welcker, E. R.: Ueber Narbenstrikturen der Speiseröhre, Inauguration Thesis, Halle, 1929.

8. Ronneaux, G.: L'électrothérapie dans les affections noncancéreuses de l'oesophage, Rev. d'actinol. **11**:367 (Sept.-Oct.) 1935.

9. Porcher, P.: Les Possibilités électrothérapiques dans certaines affections de l'oesophage et de l'estomac, Rev. d'actinol. **11**:381 (Sept.-Oct.) 1935.

10. Bensaude, R.: Bref aperçu sur l'emploi des agents physiques en gastro-entérologie, Rev. d'actinol. **11**:358 (Sept.-Oct.) 1935.

11. Cluzet, J., and Chevallier, A.: Effets moteurs et sensitifs produits par certains courants de haute fréquence, Compt. rend. Soc. de biologie **93**:1308, 1925.

12. Morse, F. H.: Indications for the Use of Sine Currents, Arch. Phys. Therapy **8**:139 (March) 1927.

13. Grandauer, Carl: Der hochgespannte Hochfrequenzstrom als therapeutiches Hilfsmittel bei Behandlung gewisser innerer Krankheiten, Fortschr. d. Therap. **5**:728 (Nov. 25) 1929.

14. Cluzet, J., and Ponthus, P.: Sur l'examen et le traitement au moyen des ondes de haute fréquence entretenues et redressées, Arch. d'électric. méd. **39**:301 (Aug.-Sept.) 1931.

15. Jones, A. C.: Constant and Interrupted Currents of Low Frequency, Cycloped. Med. Ed. 1, **5**:45, 1932.

16. Waddington, J. E. G.: Sinusoidal Therapy, Clin. Med. & Surg. **34**:657 (Sept.) 1927.

17. Brunner, Martha: Intraesophageal Diathermy in Dysphagia and Cardiospasm, Arch. Phys. Therapy **19**:670 (Nov.) 1938.

18. Weiss, Jerome: The Flasher Sinusoidal Machine, Arch. Phys. Therapy **16**:95 (Feb.) 1935.

19. Jackson, C., and Jackson, C. L.: Diseases of Esophagus, Cyclop. Med. Ed. 1, **5**:485, 1932.

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.·. EDITORIALS .·.

OUR TRIBUTE TO SCHERESCHEWSKY

With the untimely death of Dr. Joseph W. Schereschewsky, which took place at his summer home at West Harwich, Massachusetts, on July 9, at the age of 67, physical therapy loses the man who has richly earned the appellation of father of short wave therapy. While his manifold activities in various fields of medical research have secured his fame here and abroad, his labors in the domain of short wave therapy are an imperishable monument which will preserve his name wherever human suffering is combated by physical measures.

The life of this great scientist was one of uninterrupted devotion to ideals beyond the line duty, to use an expression by our public services for achievements of an extraordinary nature. Born in China, in 1873, he was brought by his parents to the United States in infancy, and after completion of his classical education at Harvard College, entered Dartmouth Medical College, enlisted while a student in the medical department of the Army during the Spanish-American War and was graduated in 1899 as a Doctor of Medicine. The same year he passed the rigid examination of what was then known as the United States Marine Hospital Service which is now designated as the United States Public Health Service, and was commissioned with the grade of assistant surgeon. This service, while quasi-military in make-up, is well known to devote itself to epidemiologic, preventive and other types of research in addition to the strictly professional aid rendered in its numerous hospitals to members of the merchant marine.

Schereschewsky almost from the start was assigned to duties which afforded him an outlet for initiative and originality. Apart from the fact that he rose to the grade of Assistant Surgeon General and finally to that of Medical Director, proof of the recognition of his great worth by our Government, the greatest part of his career is a continuous record of intricate research the most important and fruitful of which undoubtedly is that to the means of controlling cancer and other malignant growths. In this work he delved into the health problems of industrial workers, so much so that his influence on investigations into occupational diseases will be felt by his followers in and out of the governmental service for many years to come.

To us his name stands out as the pioneer who undertook countless original and ingenious experiments to determine the effects of short wave diathermy on the animal economy. This work is all the more noteworthy because it was undertaken at a time when the therapeutic aspects of the high frequency current were still clouded in a haze, so much so that it became the object of organized medicine to prove or disprove many claims which at that time seemed to be rather metaphysical in nature. During this early period of uncertainty it was Schereschewsky who undertook original investigations with the then unknown ultrahigh frequency current. His experiments with this original type of short wave electric current on animals inoculated with Rous' sarcoma stand out as an American classic which proved the sesame for future research in short wave diathermy here and abroad. The fact that it was Schereschewsky who acquainted Esau of Germany with

his investigations and special electrophysiologic apparatus, who in turn aroused the clinical interest of Schliephake, shows conclusively that any and all therapeutic measures now carried out with various short waves are the products of Schereschewsky's brain child. There is therefore no denying the fact that present day short wave therapy was originated in America by an American physician. This credit which is fully justified is not to be misinterpreted as in any way detracting from the great merits of the French savant d'Arsonval who not only discovered the principles of the high frequency current in medicine but divined its therapeutic potentialities.

In 1935, the American Congress of Physical Therapy officially recognized the tremendous value of Schereschewsky's labors in this domain by bestowing upon him the Gold Key of Merit. Although the citation accompanying this award was terse as has been the custom, it nevertheless conveyed a deep appreciation of the value of his labors and of the man as a scientific humanitarian. The Congress was actually the first official organization to have publicly given expression to the importance of Schereschewsky's contributions to physical medicine. He has had other professional honors, but as was already alluded to, it is his work as such that stands out as a scientific portent of the scientific possibilities of short wave therapy which more than human praise redounds to his glory.

Physically as well as spiritually he has left two enduring monuments to memory. One is the magnificent edifice devoted to cancer research at Harvard University, Boston, in which he labored at the time he was stricken, and the other at Bethesda, Maryland — the National Cancer Institute. In both institutions researches will be animated by Schereschewsky's unselfish devotion to the cause of science in a true humanitarian spirit. Spiritually his labors have left as an endowment the impulse to continue more and deeper investigations into the therapeutic benefits to be obtained by short wave diathermy no matter what form its future may take. This is his shrine.

STATUS OF ELECTROSURGERY

The circumstance that general electrosurgery is still employed by comparatively few surgeons suggests whether or not this form of operative procedure has fulfilled the expectation voiced when it still was in its infancy. It is now nearly two decades since the high frequency current has been made available to a degree which enables any competent surgeon to utilize it instead of the scalpel, yet with the exception of neurosurgeons and urologic surgeons the majority prefer the classic technics and fail either to investigate the advantages claimed for electrosurgery or to adapt themselves to this newer form of operative therapy. It would seem that the very reasons which today compel the named specialists to resort almost exclusively to the high frequency current instead of the sharp instruments would apply with equal logic to the conditions encountered elsewhere in the body. Yet in spite of the striking successes by Cushing and his followers and by the host of authoritative urologists beginning with Beer, the average surgeon is still averse to relinquishing his accustomed manner of operating. The question arises whether this shortcoming is justified.

An impartial study of the literature and of the actual experiences gained by a fairly large number of general surgeons throughout the world clearly shows that the first enthusiastic pronouncements which indicated virtually a revolution of modern surgical technic have actually been realized at least

to a great extent. It will be recalled that electrosurgical operations were said to be bloodless, devoid of shock and above all destructive of malignant cells, so that the surgical removal of malignant neoplasms greatly reduced the incidence of later metastases. All these claims, it must be conceded have not been realized to the fullest extent. Electrosurgery can lay no claim to being actually bloodless nor always devoid of shock. So far as the prevention of metastases is concerned statistical studies show that they are not always obviated. Yet when one investigates a large number of clinical observations one cannot but be struck by the incontrovertible fact that there is at least a limited justification for the above mentioned principal claims. This being so, it seems to be the duty of everyone engaged in the practice of general surgery and certain surgical specialties to make the greatest possible use of the high frequency currents in indicated cases. What are those indications?

Those familiar with the early history of the high frequency current will recall the classic experiment of its discoverer, d'Arsonval, in which he noted that the legs of a frog immersed in a saline solution serving as an electrode became coagulated. The present use of this property of the high frequency current can be said to date from that experiment. To Rivière, of Paris, goes the credit of having been the first to utilize this property of the high frequency current to effect cures of benign and malignant accessible neoplasms. His method added the new technic commonly referred to as fulguration. From then on a host of workers have utilized the effect of this current for a large variety of ulcerative processes and neoplastic conditions including the dental management of pyorrhea.

Later when the electrical industries developed the current in a manner to enable all soft tissues to be dissected with the same precision that is possible with a scalpel, electrosurgery received an impetus the results of which are seen in the fact that a number of leading American and European surgeons have gone to the other extreme of abandoning all classic procedures and performing any and all operations except those involving the osseous structures with the "cutting current." Their reasons for this revolution in operative technic are those given above; namely, that hemorrhage of the capillaries is virtually non-existent, that minor vessels can be controlled by coagulation and thereby reducing the number of ligatures, that even weakened individuals leave the operating table without perceptible shock, and, finally, that the element of safety in the operations of malignant structures is of inestimable value. To this should be added that postoperative pain is virtually absent even after major procedures and that scar formation of wounds is minimal. So far as dermatologic surgery is concerned one should not overlook that in very many instances the cosmetic effects of electrosurgery are far superior to those seen after routine excisions.

What has been said should clearly prove that electrosurgery has fulfilled the expectations placed in it from the very beginning. While the first claims have been somewhat exaggerated, there is enough of value in the surgical application of the high frequency currents to render them invaluable in the removal of tumors of the central nervous system, as has been so aptly stressed by Lyerly[1] elsewhere in this issue. To this should be added their great value in operations on individuals prone to bleeding, the aged, the individuals in a state of anemia, as was stressed by Blech,[2] and like conditions.

While at best this hardly epitomizes the indications and advantages of electrosurgery, it establishes that one is confronted with a method which has a distinct place in scientific surgery. Under the circumstances the fail-

ure of many surgeons to give their charges its benefits must be ascribed either to indifference or to lack of familiarity with the underlying principles and the technical problems.

References

1. Lyerly, J. G.: Electrosurgery of the Brain and Spinal Cord, Arch. Phys. Therapy **21**:459 (Aug.) 1940.
2. Blech, G. M.: Clinical Electrosurgery, New York, Oxford University Press, 1938.

In Memorium

Albert Henry Freiberg (1868-1940)

It is with profound sorrow that we announce the demise of Dr. Albert Henry Freiberg, of Cincinnati, on July 14. Dr. Freiberg was one of America's leading orthopedic surgeons who had taken a deep interest in many phases of physical therapy, because he not only recognized the great value of this discipline in the management of deformities and crippling conditions that came under his specialistic scrutiny, but took an active part as the representative of the American Orthopedic Association on the Advisory Board of the American Registry of Physical Therapy Technicians. His was a brilliant career which by sincere efforts can be said to have begun with his graduation from the Medical College of Ohio, Cincinnati, in 1890, at the age of 22, for he did not engage in practice until he had spent about six years in several large European medical centers. His surgical skill, learning and humanitarian activities could not remain unrecognized by his appreciative colleagues and a large clientele. Indeed, Dr. Freiberg's appointments as a teacher, hospital surgeon, member and officer of various specialistic and general medical organizations would fill a long list. Although heart and soul devoted to his specialty, he found time to cultivate the arts, notably music, and to take an active share in numerous philantropic bodies. Of him it can be said that when Nature tore the tools for work from his hands at the age of 72, he died honored and mourned by all who knew him. Physical therapy mourns in his death the loss of a devoted friend of organized and scientific physical medicine. The officers of the American Registry as well as the Congress and the editorial staff of ARCHIVES extend to his bereaved family their sincere condolence and express the hope that they will find solace in the thought that Dr. Freiberg's deeds will live long in the hearts of his fellow men.

Thierry De Martel

The tragic death by suicide of Thierry de Martel, on the day on which the Germans entered Paris, robs France of one of her most distinguished sons. M. de Martel was proud of his descent from that Martel who was the "Hammer of the Saracens"; the defeat of the infidels is depicted in one of the large murals at Versailles. M. de Martel for many years had worked in his own private clinics. He used to say that the money which he made in general surgery went to support such indigents as needed his help in his neurosurgical hospital in the Rue Vereigetoix. Certainly he lived very simple in spite of his great success. He was a skilful operator and an ingenious deviser of technical improvements. This was shown not only in his clamps for abdominal work, but especially in his power-driven drill for burring through the skull. This is one of the cleverest surgical tools ever devised. In other ways as well he was an innovator. He did much to fortify Harvey Cushing in his use of local anaesthesia for operations on the brain, and to minimize bleeding introduced the sitting posture for the patient. He did pioneer work in introducing neurosurgery to France, and for many years he was the most advanced exponent of this specialization on the Continent, paying tribute to Cushing but using his own mind very independently on the technical side. He will long be gratefully remembered as a brave and distinguished gentleman who happened also to be a surgeon of international repute. — *Brit. M. J.*, July 27, 1940.

SCIENCE, NEWS, COMMENTS

Mexican Government Honors Dr. G. M. Blech

Our Dr. Gustavus M. Blech has been honored by the Mexican Ministry of National Defense with the Military Surgeon's Medal and has also been elected an honorary member of the Mexican Association of Military Surgeons in recognition of his many contributions to war surgery. The many friends and officers of the Congress avail themselves of the opportunity to congratulate the General on his growing fame and increasing honors.

Dr. Philippe Bauwens Sends Greetings and Felicitations

To the Editor: — It was not without emotion that I saw the announcement of the coming annual Congress in the ARCHIVES OF PHYSICAL THERAPY. I was jerked back by the sight of it to those wonderful days which I spent among the members who attended the eighteenth Congress, and who gave me such a memorable reception. Indeed, ever since then I have thought of you all not merely as colleagues, but as friends, and it is with the warmest feelings in my heart that I write to you to ask you to convey to the participants at the Congress my best wishes for a successful session, and to those who remember me personally, my kindest thoughts.

I greatly valued the honorary membership which was conferred on me for the 1939-40 season, and much appreciate receiving the ARCHIVES which I have come to look upon as a link with my colleagues in the States.

Dr. Cumberbatch's mantle, as a teacher and examiner in the Electrology part of the Cambridge D.M.R.E. diploma, has fallen on to my shoulders, and I hope to be worthy of the torch which has been handed to me.

With kind regards to the officers and members.

PHILIPPE BAUWENS.

The University of Pennsylvania Bicentennial Conference 1740-1940

The University of Pennsylvania is completing arrangements for a Bicentennial Conference at which the list of speakers will include more than 200 American and European scholars and leaders in various fields of science and thought.

The conference, to be held on the University's campus in Philadelphia from September 16 to 20, this year, will form a part of a Bicentennial Week program commemorating the 200th anniversary of the origin of the University of Pennsylvania.

Six general fields, the Fine Arts, Humanities, Medical Sciences, Natural Sciences, Social Sciences, and Religion will be covered by the conference, during the course of which there will be eighteen general sessions and fifty-nine symposia.

In the field of the Humanities the program is designed to bring out the continuity of culture, while in other fields the objective is to reveal the trends of modern thought and the advances of science.

Membership in the five-day conference will carry with it the privilege of attending the general sessions and symposia and will be open without charge, upon application and within the limit of accommodations, to those interested in the program.

Applications for membership, of which more than 3,000 already have been received in response to invitations issued by the Bicentennial Committee, may be addressed to the Registrar of the Bicentennial Conference, University of Pennsylvania, Philadelphia.

Static Electricity Used for Industrial Separation

Static electricity, the kind that makes your hair stand on end when you comb it, is now being used by the food industry for the dry separation of particles.

Shelled nut meats can be separated from the shells. Raisins can be stripped from leaves and stem material. Watercress seed can be removed from rice, and pest seeds separated from various economic seeds, O. C. Ralston and Foster Fraas of the U. S. Bureau of Mines told the Chemical Engineering Symposium of the American Chemical Society at the University of Michigan.

Electrosatic separation — making use of the different behavior of dissimilar particles under the influence of an electric field — has long been used for mineral separation, said the Bureau of Mines scientists. To a large degree it has been superseded in this field, however, by flotation methods. In contrast, the food industries, where a dry separation is needed, use it widely and it is constantly being improved.

This progress, in turn, indicates possibilities of applications in mineral separation by the electrostatic method. One new advance, said scientists Ralston and Fraas, is to pre-condition the surface of the mineral to be separated so that the particles can be more easily drawn apart in the electric fields. Acidic gases, such as hydrofluoric, have been found effective for silicate minerals. Feldspar and quartz can be separated by this method. The hydrofluoric acid forms potassium and aluminum fluorides on the feldspar particles, whereas the quartz particles are merely etched by the treatment and silicon tetrafluoride vapor passes off.

For separation of minerals like limestone, dolomite, magnesite and borax vapors of acetic and benzoic acids have been used for the pre-conditioning treatment. — *Science News Letter.*

Vaccine Protects Soldiers Against Cootie-Borne Typhus

Practical large-scale production of a vaccine that will protect against typhus fever of the European type, lice-borne disease that menaces armies, is the accomplishment of a research group at Harvard Medical School headed by Dr. Hans Zinsser, author of "Rats, Lice and History."

Since cooties and the ill they spread may kill or disable more soldiers than bullets, the typhus vaccine is probably more important than the invention of a new anti-aircraft gun or a new kind of pill-box defense. No immunization against typhus was available during the World War. Dr. Zinsser first demonstrated the possibility in 1930.

One bacteriologist and two technicians in a week can produce over a quart of the vaccine sufficient for 300 complete immunizations. Production can be expanded by increasing equipment and personnel, whenever the need arises.

Little embyro chicks in partially hatched eggs and a germ food made from seaweeds, agar, are used for growing the Rickettsiae, the germs that cause typhus fever, which are used in making the vaccine.

In Dr. Zinsser's team working on this problem are Dr. John F. Enders and Dr. Harry Plotz, a guest worker from the Pasteur Institute, Paris. — *Science News Letter.*

Thiamin Vitamin Relieves Pain of Varicose Ulcers

Vitamin B_1 (thiamin chloride) is effective in relieving the pain of varicose ulcers, Drs. Alton Ochsner and Marvin C. Smith of New Orleans report. (*Journal, American Medical Association.*)

Ten women suffering with painful varicose ulcers were treated and all but one were definitely relieved and eight had complete subsidence of their symptoms, in an average of five days. The women varied in age from 27 to 75 years. — *Science News Letter.*

Sixth Annual Meeting, Mississippi Valley Medical Society, Rock Island, Ill., September 25-27

The Sixth Annual Meeting of the Mississippi Valley Medical Society, "The Mid-West's Greatest Intensive Post-Graduate Assembly for General Practitioners," will be held at the Hotel Fort Armstrong, Rock Island, Ill., Sept. 25-26-27. The program will be presented by 32 clinician-teachers who will give over 60 lectures, demonstrations, round table discussions, etc. A special feature of the program this year will be numerous short instructional courses, there being 41 of these scheduled.

Death From Cold Usually Preceded by Sleep or Coma

About those photographs from Finland in which Russian soldiers seemed to have been frozen to death in the act of throwing a grenade or lying with a leg straight up in the air: The *Journal of the American Medical Association* finds it difficult to understand how a person could suddenly be frozen stiff. It is considered unlikely that exposure to cold could be so sudden and the cold so severe as to eliminate the drowsiness, sleep and coma that precede death from freezing. However, great muscular effort or exhaustion previous to death, sudden death, death due to violent disturbances of the nervous system, and exposure to cold are factors predisposing to instantaneous cadaveric spasm or cadaveric rigidity. This might affect an exhausted soldier. The body may be found in a grotesque position such as kneeling or standing upright. Usually, however, there is something which supports the body in this position. All of which is not any more pleasant than the photographs. — *Science News Letter.*

New Infantile Paralysis Leads May Reveal Way It Spreads

New leads on infantile paralysis research make the eventful conquest of this crippling childhood plague seem excitingly near at hand. Research plans announced by Basil O'Connor, president, National Foundation for Infantile Paralysis, show that scientists are following new trails in their search for ways of preventing the disease.

Saliva from mouths of infantile paralysis patients both before paralysis sets in and during the paralytic stage is going to be examined for the virus that causes the disease. The clue for this line of search comes from the recent discovery of the virus in sewage from localities that were gripped by infantile paralysis outbreaks. The virus was also discovered in the intestinal discharges of patients and of healthy persons who did not have infantile paralysis but who had been in contact with patients. This proved the existence of healthy carriers of infantile paralysis, akin to the healthy carriers of typhoid fever.

How do the healthy carriers and the patients spread their germs to others? The saliva tests may give the answer to that question.

Infantile paralysis, it is now believed, spreads more like diphtheria than like typhoid fever. In infantile paralysis, as in diphtheria, there must be direct contact with a patient or a healthy carrier of the germs. In typhoid fever, water or food may spread the germs, which are discharged from the body with its waste matter.

If infantile paralysis germs, discharged with body wastes, were spread by water or food, scientists would expect everyone who used the same water and food supplies to get the disease during epidemics. But they do not. Here is a mystery the scientists hope to clear up.

Another unsolved mystery is where the virus goes in the body of patients. Where do healthy

carriers carry their germs? Scientists know the virus travels along nerves, and that when it reaches the nerve cells in the brain and spinal cord it does its chief damage. But for all that is now known, the virus may invade other tissues of the body and hide itself there. Complete information on this point will be sought by examination of all the tissues of the bodies of patients who die of the disease.

If infantile paralysis virus travels from human wastes to contaminate water supplies, will chlorination make the water safe by killing the germs? Scientists believe it will, but when they began thinking about this, they realized that germ-killing chemicals, from carbolic acid, or phenol, down are tested by their power to kill germs that can be seen under the microscope, like the colon bacillus, but not against the invisible virus type of germ. This has led to another line of research, testing the virus-killing power of chemicals, which may help with the problem of infantile paralysis and of other virus-caused diseases. — *Science News Letter.*

Heart Disease Remedies Act Like Gland Hormone

Discovery that medicines used in heart disease, such as digitalin and strophanthin, can to a certain extent double for the life-essential hormone of the adrenal gland cortex has apparently given scientists a new clue to the chemical composition of this gland substance which is a life-saver for Addison's disease patients.

The heart disease remedies prolonged the life of animals lacking adrenal glands, Dr. Raymund L. Zwemer and Bertrand E. Lowenstein, of the College of Physicians and Surgeons, Columbia University, report. From this fact and others gleaned in their latest studies, they conclude that the gland hormone may be glycoside just as the plant extracts digitalin and strophanthin are.

Patients suffering from Addison's disease, in which the adrenal gland cortex fails to produce enough of its hormone, have been helped by a synthetic chemical made in Switzerland which scientists believe from its effect on the patients is the same as the hormone from the gland. This synthetic chemical has been called desoxycorticosterone acetate. — *Science News Letter.*

Effective Chemical Cures Expected From New Test

More successful use of sulfanilamide and related chemicals in curing germ diseases is promised by a new test reported by Prof. E. K. Marshall, Jr., of the Johns Hopkins University, to the Society of American Bacteriologists meeting in New Haven.

The test, which takes advantage of the feeding habits of mice, provides a much-needed method of evaluating chemical remedies on a quantitative basis. It was worked out by Prof. Marshall and associates.

Sulfanilamide, sulfapyridine, or some other chemical remedy is mixed with the food of the mice. Because these animals eat frequently and at regular intervals, there is always some of the chemical in their systems. A constant concentration of the remedy can thus be maintained in the animal's blood and this gives a basis for determining what blood concentration is necessary to cure streptococcus infection, or which of several remedies is more effective in amounts that give the same concentration in the blood.

From such studies, Prof. Marshall explained, scientists can learn more exactly which remedy to give patients, how large a dose is effective, and how often the dose needs to be repeated. At present, he pointed out, the value of sulfanilamide and related remedies is somewhat hampered by lack of exact information on these points.

The way in which sulfanilamide acts in the body to check the growth of disease germs and thus "cure" the patient might also be determined from such quantitative comparisons with other similar chemicals. This knowledge might lead to more effective chemical remedies. — *Science News Letter.*

New Electron Microscope May "See" Atoms

A microscope that "sees" by electrons, or particles of electricity, instead of light, and that can reach so far into the depths of matter that eventually it is expected that it will be possible to "see" atoms themselves was demonstrated to members of the American Philosophical Society by Dr. V. K. Zworykin of RCA's Electronic Research Laboratories.

This latest electron microscope achieves magnifications of 25,000 to 30,000, instead of about 5,000, maximum with even ultraviolet light optical microscopes.

First research application of the perfected electron microscope is expected to be in biological fields. It is considered possible that the new microscope may help solve the problem of the nature of the viruses that cause certain unconquered diseases. Already in preliminary work unidentified particles evidently associated with disease germs, but hitherto unsuspected, have been seen. Extremely fine particles in materials of industrial importance, such as rubber latex, are shown to have shapes different from those they were believed to have. — *Science News Letter.*

Franklin Medals Awarded to Compton and Baekeland

Franklin medals, highest awards of the Franklin Institute, were presented on May 15 to Dr. Arthur H. Compton of the University of Chicago for his researches on X-rays and to Dr. Leo H. Backeland for his invention of the synthetic plastic, Bakelite.

Other awards announced are: Elliott Cresson medals to Dr. Frederick M. Becket, president, Union Carbide and Carbon Research Laboratories, for his researches on alloys, and to Dr. Robert R. Williams, chemical director, Bell Telephone Laboratories, for his researches on vitamin B_1.

The Louis E. Levy medal jointly to Dr. Charles Rosenblum of Princeton and Dr. John R. Flagg of the University of Rochester, for their researches on artificial radioactive indicators.

The George R. Henderson medal to William E. Woodard, Lima Locomotive Works, for steam locomotive design.

The John Price Wetherill medals to Laurens Hammond of Chicago, for the Hammond Organ, and to Edward E. Kleinschmidt, Highland Park, Ill., and Howard L. Krum, Beverly Hills, Calif., for the development for the teletypewriter.

The Edward Longstreth medals to Leopold Godowsky, Jr., and Leopold D. Mannes of Eastman Kodak Company, for development of Kodachrome film, to Games Slayter of Owens-Corning Fiberglas Corp., for development of spun and blown glass filaments, to Richard L. Templin of the Aluminum Company of America for an automatic deformation recorder, to Dr. Maxwell M. Upson, Raymond Concrete Pile Company, for contributions to foundation engineering and construction. Certificate of merit to George H. Ernsbarger of Honolulu and Frank L. McCarty of Ogden, Utah, for development of a loading device. — *Science News Letter.*

Diabetics Miss Toothaches

Diabetic children in general are spared the nagging pain of toothaches and the discomfort of having cavities in their teeth filled, it appears from a report by Dr. George Stein, of the Harvard Dental School.

A group of 82 patients who had acquired diabetes during childhood gave Dr. Stein the information he reported. Examination of these patients showed that caries, or tooth decay, was infrequent. If there was a marked susceptibility to caries at the onset of the diabetes, the progress of the caries and acquisition of new caries was slowed.

Difference in nutrition seems not to be the only reason for the low susceptibility to caries, as all the patients Dr. Stein examined are on a normal mixed diet. Changes in the composition of the saliva and other factors seem to play a part, he said.

Pyorrhea and other diseases of the gums, on the other hand, do afflict diabetics, particularly as they grow older. Pyorrhea was not found affecting the temporary or "baby teeth," but one-fourth of the patients over 18 years of age had pyorrhea or other diseases of gums and tooth sockets, and three of these patients had lost all their teeth by loosening. — *Science News Letter.*

New Coated Lenses Better Than Costlier Old Ones

Moderately priced binoculars, thanks to a new coating for their lenses, can be made as effective as more expensive instruments of the past with untreated lenses on account of a development by Dr. John Strong of the California Institute of Technology, reported by W. C. Miller of Paramount Pictures to the Society of Motion Picture Engineers at Atlantic City.

Paradoxically, by coating lenses with a transparent film of the order of a millionth of an inch thick about 85% of the surface reflection is eliminated and the light is no longer reflected goes through the lenses and makes the vision more effective. This reflection-suppressing trick is being used wherever optical glass lenses are being used, in microscopes, cameras, motion picture cameras, motion picture projectors, etc. Motion picture projector lenses treated with the new film show a 50% increase in screen brightness, it is reported. — *Science News Letter.*

Liquid Wood Promises New Plastic Industries

Liquid wood, produced by the same kind of methods by which Germany is now creating much of its gasoline from coal, is the newest product of Canadian chemical science. Water-white liquids are obtained which chemists believe will provide the raw materials for a future synthetic organic chemical industry. Prof. Harold Hibbert of McGill University described the new way of processing wood at the meeting of the American Chemical Society.

One of the new liquid woods, Prof. Hibbert explained, "is so closely related to the raw material from which the synthetic fiber nylon is made that it should readily prove possible to obtain from it a new variety of this interesting fiber, the raw material being wood instead of coal."

Liquid woods are made under high pressure by adding hydrogen to the molecules. A similar method can be used with coal to make liquid petroleum in a way first discovered by the German Nobelist, Dr. Friedrich Bergius.

Prof. Hibbert sees in his new liquid wood a way to utilize the tremendous masses of waste wood of the world. — *Science News Letter.*

Recovers From Insanity Within Fifteen Minutes

Recovery from insanity within 15 minutes after a single dose of nicotinic acid has been announced as an example of the spectacular achievements of the pellagra remedy in conquering some forms of mental disease.

Most of the patients who have been rescued by this chemical from stupor, lethargy, depression showed no signs of pellagra, Dr. V. P. Sydenstricker and Dr. H. M. Cleckley, of the University of Georgia, declared in their report to the American Psychiatric Association meeting in Cincinnati.

The spectacular, 15-minute recovery occurred in the case of a 66-year-old man who was admitted to the hospital in a greatly agitated state, not realizing where he was and behaving irrationally. He shouted in broken sentences, tried to leap out of bed and was constantly overactive and confused. The doctor's description is typical of the old idea of an insane person.

While the nicotinic acid solution was still flowing into his vein, this man became quiet and cooperative and within a few minutes showed no sign of his mental illness.

Many other patients who seem to be suffering from mental disease or exhaustion delirium, even without signs of pellagra, may, the Georgia doctors believe, be relieved of their symptoms by nicotinic acid. — *Science News Letter.*

BOOK REVIEWS

AS I REMEMBER HIM. The Biography of R. S. By *Hans Zinsser*. Cloth. Pp. 441. Price, $2.75. Boston: Little, Brown & Company, 1940.

This fascinating contribution in the manner of an informal biography about an imaginary friend will be acclaimed by the literati as the best all revealing and brilliant document written by one of our most respected and esteemed leaders of the medical profession. To the majority of us the name of Professor Hans Zinsser arouses a picture of a scholar cloistered in a laboratory amidst Petri dishes filled with swarming microbes, searching and researching for that fourth dimensional sphere in health and writing ponderous tomes that are the forced reading of unwilling students harnessed to an inviolable curriculum. Yet this same personage has come to be regarded by his immediate acquaintances and a selected group of readers as one blessed with an *alter ego* as vivid, vital and imaginative in its intellectual sweep as any possessed by those who have devoted all their high talents to the pursuit of *belles lettres*. It is an extraordinary gift to be an authority on bacteriology and immunology and to receive the laurel wreath of having written this year's most interesting biography (about himself) in a style that flashes with wisdom and philosophy, that is mordant, friendly and yet sufficiently piquant with personal experiences to hold the reader's attention to the very last line. Writing about an imaginary R. S. (himself), the author proves himself not only a brilliant raconteur but becomes his own Boswell. He recounts the experiences of this imaginary other self with flashing wit, deep learning and humanitarian tolerance. Born and educated in America, R. S. finds himself impatient with all the cracked isms and mass hysteria current in a world boiling with ignorance, disease and false economic messiahs. R. S. develops a rich experience and learning, for Medicine in his lifetime has called him to the four corners of the earth, wherever there was war and infection. He visited Serbia in 1914-1915 and was in the American Army in France and in Russia after the great famine, as well as in Mexico and China fighting as a scientist the dreaded war against infection. As a teacher his reminiscences carry him from such scholastic centers as Columbia, Leland Stanford, Harvard, and from lecturing at the Sorbonne and universities in China and Japan. As a linguist and student of humanity Zinsser has been an avid reader of the world's classics often in the original, as a poet he has had his contributions published in the *Atlantic Monthly*, and as a philosopher he has viewed the world events with vision and tolerance — a blend that has made of a scientist a warm humanist and an inspired writer. This biography is a must book for the medical profession, for it is certain to become as much a classic in medical literature as have the writings of Cushing, Osler and others. This remarkable book is the legacy of a great physician which one will read and reread with growing appreciation in the years to come.

PHYSICAL THERAPY FOR NURSES. By *Richard Kovács*, M.D., Clinical Professor and Director of Physical Therapy, New York Polyclinic Medical School and Hospital, etc., etc. Cloth. Second Edition, thoroughly revised. Pp. 335 with 99 illustrations. Price, $3.25. Philadelphia: Lea & Febiger, 1940.

The gratifying reception of this work for nurses and technicians has necessitated the issuance of a second edition which has been thoroughly revised and brought down to date. Four new chapters have been added, which succinctly review the history of physical therapy by connecting the progress in this field with names responsible for some of the important innovations. It touches upon the curative action of heat and water and their adoption by outstanding pioneers in medical practice. It also describes the ancient recognition of sun therapy and its modern artificial counterparts, the countries credited with its development and the men famous for their contributions. The history of medical electricity is depicted as arising from the shocks of electric fish and reaching the stage of such modern methods as the galvanic, faradic, static and high frequency currents. Massage and exercise are historically classified and their progress described. A new chapter on fever therapy presents the development of this relatively new mode of practice and gives a clear picture of its action and technics, its complications and dangers as well as its indications. The new chapter on short wave diathermy is a conservative estimation of its clinical possibilities and technics. The author is to be commended for his courage in discussing the value of colon irrigation and presenting a fairly well balanced and conservative review of opinions pro and contra this practice. In addition to the new chapters, 47 illustrations have been added and others deleted. The book has retained the clear exposition of the original text as well as the questions appended to the end of most chapters. The format is everything that deserves praise.

ILLUSTRATIVE ELECTROCARDIOGRAPHY. By *Julius Burstein*, A.B., M.D., Associate Electrocardiographer and Chief of the Cardiac Clinic, Morrisania City Hospital, Cardiologist St. Elizabeth's Hospital, New York, Associate Cardiologist Jewish Memorial Hospital, New York, Assistant Cardiologist Riverside Hospital, New York. Second Edition. Cloth. Pp. 292. Price $5.00. New York: D. Appleton-Century Company, 1940.

The first edition of this cardiographic atlas which appeared about five years ago had the late Dr. Joseph H. Rainton as co-author. Since that time new methods of investigation and interpretation of

electrocardiograms have been developed and it has become the task of Dr. Burstein to present them in this edition, a task which the surviving author has carried out in a highly satisfactory manner. Thus chest leads, which in the early period were little used and interpreted have been fully explained in the text and depicted by illustrative reproductions of cardiograms. The author furthermore has succeeded in rendering clear the problems of precordial leads, so that even general practitioners will be able properly to interpret this complicated phase of electrocardiography. While the text proper has been enlarged in the sense of a number of details, the fundamental make-up of the first edition has been retained, so that the descriptions accompanying more than one hundred excellently reproduced electrocardiographic plates are lucid and followed with ease. The arrangement of the text is logical. Divided into 16 chapters, the volume, which measures 6½ by 9½ inches, opens with technical fundamentals and normal electrocardiograms and continues with all known abnormalities and effects of digitalis on the cardiogram. It was already pointed out that chest leads have been added. A chapter which serves to caution against misinterpretations deals with artefacts produced by bodily influences. Each plate is provided with a critical text. An excellent index concludes this combined atlas and textbook, the format of which leaves nothing to be desired. All interested in the making or interpretation of electrocardiograms will find this book valuable as a guide.

PHYSICAL TREATMENT BY MOVEMENT, MANIPULATION AND MASSAGE. By *James B. Mennell*, M.A., M.D., B.C., (Cantab.) etc., Consulting Physicotherapist, St. Thomas' Hospital, and Lecturer, Massage Training School. Fourth Edition. Cloth. Pp. 669 with 281 illustrations. Price, $7.00. Philadelphia: The Blakiston Company, 1940.

Six years ago the third edition of this outstanding monograph was published and during this period many scientific studies dealing with mechanotherapy have been completed adding valuable data to the physiologic effects of massage, movement, exercises and similar therapeutic methods on certain tissues, and pathologic conditions. All these have been incorporated in the present volume which has not only been thoroughly revised but enlarged by a number of pages of descriptive text. In the main the fundamentals given in previous editions to which the distinguished author ironically refers as "unorthodox" form the basis of the present edition. The book is divided into no less than 38 chapters, only the first of which is rather personal in narrative. The remainder is so rich in technical material that the mere enumeration of the titles of the chapters would require more space than is available. Suffice it therefore to say that the work is intended for physicians for the purpose of familiarizing them with the indications and different technics of the methods stated in the title in a manner to be applied to a vast number of varying conditions. In addition the author takes up such important problems as massage for wounds, re-education of amputated limbs, the use and abuse of the faradic current, baths and other auxiliary procedures — all discussed critically in a very readable style. The authority of Dr. Mennell is such as to command confidence in his teachings. Certainly physical therapeutists will find this monograph of great help, but even general practitioners, general and orthopedic surgeons will find the work a means of becoming familiar with all concerned problems so as to enable them intelligently to direct the work of trained technicians.

CONVENTION MOTION PICTURE THEATRE

A motion picture theatre will be conducted at certain periods throughout the week of the annual meeting. On Monday, September 2, the entire morning will be devoted to showing of films dealing with physical therapy problems, such as apparatus, technic, etc. Those desiring to have their films shown are urged to communicate with Dr. *Norman E. Titus,* Chairman, Motion Picture Committee, Hotel Statler, Cleveland, Ohio.

INTERNATIONAL ABSTRACTS

Investigation of Electrolytic Rectification in Nerves. Lewis J. Pollock, and Isidore Finkelman.

Arch. Neurol. & Psychiat. **43**:693 (April) 1940.

Experiments on the basis of which Pflüger's law of contraction was postulated were repeated and the results found variable. Since it was believed that the contractions probably were the result of stimulation by stray electrostatic fields or currents, experiments were performed to study the response of a nerve to stimulation by currents produced by the discharge of a condenser and stray electrostatic fields developed within a coil. In both instances, within certain limits, an effect similar to rectification was observed. Thus, when the nerve responded to a wave in one direction it did not respond to one in the opposite direction, irrespective of whether in relation to the nerve, the current was ascending or descending. When by suitable apparatus and circuits, the possibility of stray electrostatic currents was diminished, the nerve did not respond to make and break stimuli in accordance with Pflüger's law.

In the same preparation, when successive stimuli in only one direction were used, a reversal of the reciprocal relationship between the efficacy of make and of break contractions could be brought about. At the same time, when the output of the after-current was measured, it was found that as the stimuli were continued, the output increased to a certain point, then progressively diminished to zero, changed in polarity and progressively increased in the opposite direction. Since the last two observations show that the electrolytes of a nerve are amphoteric, the relative efficacy of make and break stimuli could not be related to the direction of the stimulating current, ascending or descending, or the inefficacy of a make or break stimulus to polar electrotonus.

By means of a charge and discharge key, on closing the circuit, the current from a battery was conducted through a nerve, and when this circuit was opened another circuit was closed through a galvanometer, discharging and measuring the charge put on the nerve by closing the stimulating circuit. It was found that at the first opening of the circuit little or no electricity was discharged, but that with successive stimuli the nerve acted as an electrolytic condenser in the state of being formed and acquired increasing ability to hold a charge. As the size of the discharges increased, contractions appeared in opening the circuit and successively became greater and greater. It is therefore suggested that the contractions resulting from opening a circuit are related to the discharge of a charge put on the nerve when the stimulating circuit is closed. As the discharges became larger and larger and the break contractions stronger and stronger, the make contractions which were strong became weaker and weaker and finally disappeared. An electrolytic condenser is also an electrolytic rectifier, and as its ability to hold a charge increases, so does its forward conductance diminish. It is suggested that when successive or prolonged stimuli produce in the nerve an electrolytic rectifier of sufficient efficiency, stimuli in the direction of the charging current produced by closing the stimulating circuit are rectified and thus no contraction results.

Roentgen Demonstration of the Action of Short Wave Irradiation on the Diseased Bone Tissue. G. Gabriel.

Ztschr. f. Orthop. **70**:157, 1939.

The author discusses ultrashort wave therapy in a case of traumatic osteomyelitis of the calcaneal apophysis in a 13 year old child. The course of the injury following the accident was that of abscess formation under the heel with sequestrum formation. Following this a fistulous tract formed. Ultrashort wave treatment caused a definite improvement in the pathologic process as noted by serial x-ray studies of the foot. After six months treatment healthy bone tissue was noted and union was established. The author states that the above treatment may have to be preceded by incision and drainage in a severe osteomyelitic process. Favorable action has also been noted in fractures of the wrist by the use of short wave.

Treatment of Rheumatic Joint Diseases With Natural Sulphur Baths and Sulphur Injections. A. Evers.

München. med. Wchnschr. **86**:775 (May 19) 1939.

Hydrogen sulfide baths are reported to be highly beneficial in rheumatic joint diseases. The baths act as a powerful stimulant to the vasomotor system. The local hyperemia is the result of increased capillary circulation. By avoiding high bath temperatures, the sulphur perfused through the skin causes an increase in vitamin C blood levels. By the injections of small amounts (3-5 mg.) of sulphur, albumin metabolism and chloride levels in the blood can be improved. Chronic arthritic joints are found to swell less under this treatment. The author found that artificial sulphur baths are not comparable to the natural ones and only by the parenteral administration can the same results be reached. The technic of the baths is fully described.

Treatment of Psoriasis With Concentrated Viosterol. George E. Clarke.

Arch. Dermat. & Syph. **41**:664 (April) 1940.

Because of the involution of many psoriatic lesions during the summer months, when there is the greatest exposure to sunlight, Krafka was led to the hypothesis that large quantities of vitamin D would be beneficial in the treatment of psoriasis. Three patients were treated with halibut liver oil with viosterol or with viosterol in varying amounts up to 20,000 U.S.P. units of vitamin D per day. In two cases the condition was of long standing; in the other, of fairly recent origin. In all there was material improvement.

Comparison of Skin Reaction in Irradiation Erythema and in Direct Pigmentation. H. Hamperl; U. Henschke, and R. Schulze.

Virchows Arch. f. path. Anat. **304**:19, 1939.

The authors summarize their observations on erythemogenesis and pigmentation by pointing out that the skin erythema by direct and subsequent pigmentation by ultraviolet rays is the result of two different wavelengths. Direct pigmentation is caused immediately after irradiation and is the result of an active hyperemia. The wavelength is from 430 to 300μ. Subsequent pigmentation following ultraviolet irradiation appears after two to four hours, reaches a maximum after six to eight hours, with pigmentation after twenty-four hours. The wavelength is lower than 320μ. The two processes may be superimposed in the region of 300 to 320μ. Individual sensitivity of skin and habituation play a strong part in determining the gradation of erythema production. The authors studied histological sections of skin irradiated under different wavelengths.

Bechterew's Disease: Treatment with Baths. Helmut Pohl.

Balneologe **6**:348 (Aug.) 1939.

The author discusses the Landeck Bath cure in spondylitis deformans. Heated radium sulphur baths are employed conjointly with massage and vapor douches. Active and passive motion and mechanical appliances are of further aid in muscle reeducation. Cases of joint limitation in the shoulder and neck showed distinct improvement. From 30-50 patients with Bechterew's Disease (spondylitis ankylopoetica) are treated at the spa each year. Of 246 patients treated, 198 were improved, 44 unchanged and 4 aggravated.

Influence of Cold on Carbohydrate Metabolism. K. Samaras.

Ztschr. f. d. ges. exper. Med. **106**:377 (Oct. 10) 1939.

Samaras carried out experiments on the effects of cold on carbohydrate metabolism in male white rats. Several days before the experiments the animals were given a diet with a high carbohydrate content and five hours before they were given 0.5 Gm. of dextrose for each hundred grams of body weight. The dextrose in the form of a 25 per cent aqueous solution was introduced through the stomach tube. This dextrose was given in order to effect a maximal filling of the carbohydrate depots. Twenty-four hours before the cooling experiment the urine of the animals was tested for creatine and only those were used in which the urine was free from it. Immediately before the cooling experiment the temperature of the animals was measured. The cooling was effected by placing the rats in water that had a temperature of from 2 to 3 C. (35.6 to 37.4 F.). Care was taken that the head was not under water. The animals remained in the cold water five to ten minutes. First there were violent movements with the extremities, then the animals became fatigued and finally they fell into a collapse-like faint. After withdrawal from the water, the temperature was determined at definite intervals. To determine the changes in the glycogen content of liver and muscles, groups of five animals each were killed after intervals of one, two, four, nine, twenty-four and thirty hours. The author found that the sudden reduction of the body temperature to less than 22 C. (71.6 F.) produces a temporary moderate increase in the blood sugar content, an almost complete disappearance of hepatic glycogen and reduction in the muscular glycogen amounting to almost 50 per cent. Finally there is a creatinuria which persists two to three days. These are manifestations of the chemical heat regulation, which aims to restore the lost heat as soon as possible. New heat is formed first by the combustion of the preformed stores of carbohydrates in the organism. However, it seems probably that the combustion of sugar plays an important part only immediately after the cooling process. Many factors indicate that the combustion of fat soon takes the place of the sugar combustion and that most of the newly formed heat can be traced to fat combustion. — [Abstr. J. A. M. A. **114**:628 (Feb. 17) 1940.]

Irradiation With Quartz Lamp in Vacation Colony. H. Lugt; P. Lakeman, and N. Lubsen.

Nederl. tijdschr. v. geneesk. **83**:5333 (Nov. 11) 1939. Partial Index.

Lugt and his collaborators report that children who were in a vacation colony at a seaside resort during the winter months were daily exposed to ultraviolet radiation. Quartz lamps were set up in the room where the children were playing, dressed in swim suits. On the first day there they were subjected to this irradiation for ten minutes. The period was extended daily by five minutes until forty-five minutes had been reached. Otherwise the children were given the usual treatment. They had been selected for a six weeks stay in the vacation colony by the school physician; all of them were weak but healthy. In order to determine a possible influence of the quartz lamp irradiation the authors examined the hemoglobin content and the weight of children who had not received irradiations and in those who had. Studies were made on five groups (a

total of 326 children). It could not be demonstrated that the irradiation augmented the hemoglobin content. As regards the increase in weight, the favorable influence of irradiation must be doubted. Some of the children were reexamined three weeks after they had left the vacation colony and it was found that the hemoglobin content was noticeably greater in the irradiated children than in those who had not been irradiated. At any rate there are indications that other influences such as good food and change of surroundings predominate over the possible influence of quartz lamp irradiations. The authors were able to confirm that the augmentation in the hemoglobin content was greatest in the children who were admitted to the colony with a low content. — [Abstr. J. A. M. A. **114**:454 (Feb. 3) 1940.]

Treatment of Epidermophyton Infection With Copper Iontophoresis. O. Jersild, and Marie Plesner.

Ugesk f. laeger **101**:1467 (Dec. 14) 1939.

Jersild and Plesner discuss seventy-nine cases of this infection treated since their first report on copper iontophoresis. In 66 cases the disease was localized to the feet, in 12 to the hands and in one to the genitalia, hands and feet. In most of the cases the duration had been several months, in some, years. As a rule one or two treatments were effective, and in most cases an average of from five to six treatments sufficed; in a few instances ten or twelve treatments were necessary. Sixty-nine patients were discharged completely cured, eight still presented slight desquamation on discharge, and two left before completing treatment. No after-examinations have been made because of the difficulty in distinguishing between recurrence and reinfection. — [Abstr. J. A. M. A. **114**:834 (Mar. 2) 1940.]

Ultraviolet Rays in Whooping Cough. P. Delthil, and G. Peuteuil.

J. de radiol. et d'electrol. **23**:385 (Sept.) 1939.

Delthil and Peuteuil point out that the multiplicity of methods which have been recommended for the treatment of whooping cough indicates that none of them insure constant successes. On the other hand it has been recognized that the patient's general condition is of great importance for its prognosis. Consequently, attempts have been made to increase the defenses of the body. Some investigators have recommended ultraviolet rays. However, in spite of the good results obtained by them, this method apparently has received little attention. The authors found that the attacks of coughing diminished rapidly in number and intensity after the second or third irradiation. The attacks of vomiting which appear to the families as the most distressing of the symptoms, are influenced even more effectively by the ultraviolet rays. Sometimes the vomiting is arrested before the cough has improved. The disappearance of the attacks of vomiting permits better nutrition, and the diminution of the cough favors sleep. Thus the emaciation is arrested. This is especially important in nurslings. The authors further stress that, by reducing the cough and by acting on the general condition, the ultraviolet rays prevent complications. Actinotherapy constitutes a veritable shock therapy, which is revealed by fever, agitation with insomnia, temporary leukopenia and hypotension. The erythema and the actinic pigmentation indicate hormonal modifications; there is no erythema without signs of biologic shock. These phenomena have been explained by sudden changes in the serum albumins. The authors assume that the calming effect on the nervous system, the regulating effect on the neurosympathetic tonus or the reestablishment of normal calcemia and phosphatemia have an essential part. They do not recommend actinotherapy for the onset of the disease, but the irradiations should be begun between the tenth and fifteenth days. The ray should be applied in such a manner that erythema and pigmentation are produced as quickly as possible. The distance from the source of light is at first 90 cm., and at the second or third session it may be reduced to 75 cm. To test the cutaneous sensitivity of the patient, the authors begin by applying the rays one minute to each side of the body. If no erythema results, the time is extended to three and then to six minutes. If a mild erythema is produced, the dose is gradually increased to avoid a too violent reaction; for instance, the irradiation is extended to seven or eight minutes. After shock, erythema and fever have been produced, the subsequent exposures can be of equal length. The number of irradiations varies between four and twelve. — [Abstr. J. A. M. A. **114**:361 (Jan. 27) 1940.]

Cooperative Management of Allergic Rhinitis. A. R. Hollender.

J. Florida M. A. **36**:347 (Jan.) 1940.

Utilization of certain local procedures on an empiric basis, is, in the author's opinion, justified when failure has resulted from a comprehensive course of indicated treatment. It is in this group of stubborn and resistant cases that he advocates zinc iontophoresis as a simple, safe and effective means of affording prolonged palliation.

Action of Ultraviolet Radiation on Epinephrine. H. Konzett, and W. Weis.

Arch. f. exper. Path. u. Pharmakol. **193**:377 (Oct. 24) 1939.

Konzett and Weis point out that Ewing and his collaborators, in examining the action of ultraviolet radiation on epinephrine, synephrin and ephedrine, observed a contradictory behavior. Whereas epinephrine was found to lose its intensifying action on the blood pressure and the blood sugar, the efficacy of synephrin increased. Ephedrine responded like epinephrine with a loss. Ewing and his co-authors assumed that this change in action was due to oxidative processes

but made no attempt to explain the contradictory results in epinephrine and synephrin. Konzett and Weis assume that the change in the action of synephrin is due to the fact that epinephrine is formed in it under the action of ultraviolet rays. They report experiments to explain this problem. They state that epinephrine loses its blood pressure action as the result of ultraviolet irradiation. The fluorescence of the epinephrine solutions decreases in the same measure as does the blood pressure action. Under the influence of ultraviolet irradiation, the epinephrine solutions assume at first a reddish color, then a reddish yellow one and finally they again become colorless. The destruction of epinephrine takes place even under exclusion of oxygen. From synephrine there develops under the influence of ultraviolet rays a body with an intense pressor effect, which on biologic and chemical tests proved to be epinephrine. The maximal value of epinephrine in the irradiated synephrine solutions amounts to from 8 to 10 per cent of the originally existing synephrine; in the concentrated solutions this maximum is obtained later than in the diluated ones. However, under ultraviolet irradiation epinephrine is not only formed but also destroyed in synephrine solutions. At first its formation predominates, but later with growing exhaustion of the stores of synephrine and destruction of epinephrine predominates. Oxygen is absolutely necessary for the transformation of synephrine into epinephrine.—[Abstr. J. A. M. A. **114**:627 (Feb. 17) 1940.]

"Spas" — "Have Spas an Essential Place in the National Economy and How Responsible Is Organized Medicine in Its Efforts to Promote and Control Their Activities?" John Carroll.

New York State J. Med. **40**:23 (Jan. 1) 1940.

Control of and regulation of exercise in the spa regimen is of great importance, and of paramount importance to every individual below par. The variety and amount of exercise in many conditions such as heart disease, vascular states, metabolic diseases, obesity, malnutrition, anemias require as precise definition as drugs and diet. At the modern spa there are trained technicians in passive exercise — the Zander apparatus, the graduated incline, paths, and the more strenuous forms of golf, tennis, and horseback riding. Exercise within the capacity of the heart and body to do easily is the best therapeutic agent known, but the evaluation of the kind and amount often requires an experienced physician's judgment. Rest and repose will allow a patient with embarrassed circulation to realize compensation at basal levels, but restoration of compensation in activity requires skilled management of exercise.

A searching effort should be made by the medical profession in supporting spas so that they may function properly in an ethical and creditable way. Criteria in regulation and control should be by agreement arrived at by cooperative representatives of organized spa personnel with interested and informed members of medical societies.

The Digital Plethysmograph as Measure of Peripheral Circulation. Carl A. Johnson.

Surg., Gynec. & Obst. **70**:31 (Jan.) 1940.

Immersion of the hand in water at 54 C. (113 F.) was used to promote vasodilatation in all instances. This procedure forms a very simple test to differentiate functional from organic changes in the blood vessels.

Two types of artificial fever were studied: (1) external heat with the prevention of heat loss, and (2) foreign protein fever. Although the application of external heat to the body has continued to the present time since antiquity, it is only in more recent years that intensive studies on its physiologic effects have been made.

One of the many physiologic effects is increased circulation. If the heat is applied beyond the capacity of the body to dissipate it, fever results particularly if heat loss is interfered with. Plethysmographic and other studies on the circulation were made by Johnson, Scupham, and Osborne in a number of patients in whom fever had been induced by various forms of external heat.

It was concluded that external heat produces (1) marked increase in the circulation, (2) circulation reached a maximum at temperatures between 103 and 104 F., while (3) higher temperatures produced a decrease in the circulation and vasomotor instability. It was furthermore concluded that none of the methods of inducting fever had any point of advantage except that of convenience and safety.

Comparative Analysis of the Effects of Cold and Thyrotropic Substance on Thyroid Gland. Paul Starr, and Rigby Roskelly.

Society Proceedings, J. A. M. A. **114**:614 (Feb. 17) 1940.

Numerous workers have found hyperplasia in the thyroid of guinea pigs and rats which have been exposed to cold. Groups of rats were kept in an ice refrigerator under controlled conditions for 3, 7, 14, 18, 21, 35, 45 and 56 days. In all, seventy-five animals were used. The thyroid was then removed and prepared for microscopic study. The microhistometric method of Starr and Rawson was used to measure the degree of hyperplasia. Control animals living at room temperature had a mean thyroid cell height of 5.19 microns. After 7 days in the cold the mean had risen to 5.97 microns, at 14 days it still was only 6.10, and at 21 days it was 8.15 microns. After this time the cell height declined to 6.40 microns at 56 days. This curve thus has an early low plateau, an additional rise after fourteen days and a gradual fall, i. e., a complex concave curve. In comparison, the curve of cell height response to increasing doses of thyrotropic substance in guinea pigs shows early acceleration and gradual approach to a maximum response, i. e., a simple convex curve. This suggests different mechanisms of thyroid stimulation.